

ENVIRONMENTAL ASSESSMENT

**Brawley Mountain Woodland Project
Chattahoochee National Forest
Blue Ridge Ranger District
Fannin County, Georgia**

August 2008

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U.S.D.A. Forest Service

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TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION.....	5
PURPOSE AND NEED FOR ACTION.....	9
FOREST PLAN DIRECTION.....	10
PROPOSED ACTION.....	11
DECISIONS TO BE MADE	14
PUBLIC INVOLVMENT- ISSUE IDENTIFICATION	14
ISSUES	15
Significant Issues	15
Non-Significant Issues.....	16
CHAPTER 2 - ALTERNATIVES.....	21
ALTERNATIVES TO THE PROPOSED ACTION.....	21
MITIGATION MEASURES AND MONITORING COMMON TO ALL ACTION	
ALTERNATIVES.....	23
COMPARISON OF ALTERNATIVES	24
ALTERNATIVES CONSIDERED BUT NOT FULLY DEVELOPED.....	25
CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES	27
PHYSICAL ENVIRONMENT.....	27
Element – Soils	27
Element - Water	36
Element – Scenery	41
Element – Cultural Resources.....	49
BIOLOGICAL ENVIRONMENT.....	51
MAJOR FOREST COMMUNITIES.....	54
Element: Mesic Deciduous Forests.....	54
Element: Eastern Hemlock and White Pine Forest.....	58
Element: Oak and Oak-Pine Forests.....	60
Element: Pine and Pine-Oak Forests.....	64
SUCCESSIONAL STAGE HABITATS	67
Element – Successional Forests and Mixed Woodlands, Savannas, and Grasslands.....	67
Element – High Elevation ESH	77
Element - Old Growth.....	83
Element - Forest Interior Birds	98
Element - Permanent Openings, Old Fields, Rights-of Way, Improved Pastures ..	101
SPECIAL HABITAT ATTRIBUTES	104
Element - Riparian Habitats.....	104
Element - Snags, Dens, and Downed Wood	106

VIABILITY CONCERN SPECIES.....	109
Element - Aquatic Habitats Including Threatened, Endangered, Sensitive and Locally Rare Aquatic Species.....	109
Element – Terrestrial Threatened, Endangered, Sensitive Species and Locally Rare Species	112
Element – Golden-winged Warbler	122
 DEMAND SPECIES	125
Element - White-tailed Deer	125
Element - Black Bear	128
Element – Ruffed Grouse.....	131
 SOCIAL EFFECTS	134
Element: Recreation.....	134
Element: Public Health and Safety	136
 OTHER CONSIDERATIONS.....	141
Consumers, Civil Rights, Minority Groups, and Women.....	141
 APPENDICES	143
APPENDIX A. STANDARD MITIGATION MEASURES FOR HERBICIDE USE	144
APPENDIX B. RESULTS OF THE RISK ASSESSMENT – DETAILED SUMMARY	147
APPENDIX C. PESTICIDE EMERGENCY SPILL PLAN	155
APPENDIX D. AGENCIES AND INDIVIDUALS PROVIDING CONSULTATION	163
APPENDIX E. PERSONS, AGENCIES, AND ORGANIZATIONS PROVIDING PUBLIC INPUT.....	163
APPENDIX F. PERSONS AND ORGANIZATIONS NOTIFIED OF THE PROPOSED ACTION	164
APPENDIX G. LIST OF PREPARERS.....	165
APPENDIX H. REFERENCES.....	166

CHAPTER 1

INTRODUCTION

The US Forest Service is charged with the management for healthy ecosystems on a portion of the Nation's real estate. In Georgia that is the approximately 850,000 acre Chattahoochee-Oconee National Forest. One part of that overall charge is to maintain habitat for viable (self-reproducing) populations of native vertebrate species. In carrying out that responsibility, the Forest Service variously either creates and then maintains needed habitats or maintains them where they already occur. Each habitat is associated with a group of species using it. Within these associations of species and habitats, individual species may be viewed or monitored as a 'barometer' of ecosystem health for both the habitat itself and the group of species that use it.

Within this very general conservation strategy, special attention is given to 'species of concern'. The geographic scale of the concern starts at the entire range of the species and steps down to just the Georgia portion of their range then finally their occurrence on National Forest. These species include those listed under the Endangered Species Act (ESA), considering their entire range; (1) as threatened or endangered or (2) proposed for listing as threatened or endangered. The Forest Service also has the responsibility to manage so as to avoid a species becoming listed under the ESA. Sensitive species are those species that currently are not listed under ESA but are rare across their entire range. Finally, locally rare species are those species that may be secure globally but are rare at the State or Forest-level. This includes many of the State-Listed species. A 'red flag' of a species trending toward listing is declining populations.

The golden-winged warbler (*Vermivora chrysoptera*) is a migratory songbird whose population has severely declined over much of its range in recent decades. Over the last 40 years, it has declined approximately 3.1 % per year range-wide and approximately 8.6% per year in the Blue Ridge Mountains (Figure 1) (Sauer et al. 2007). Recent analysis of breeding bird population trends on Southern National Forests (1992-2004) indicates that golden-winged warblers also have decreased on National Forests in the Southern Blue Ridge (La Sorte et al 2007). Only 2 records of golden-winged warblers were reported from breeding bird surveys from the Chattahoochee National Forest over this 13 year period (940 point counts). It was recently added to the State of Georgia's Protected Species List as Endangered. It also is on the Chattahoochee-Oconee National Forest list of locally rare species.

Golden-winged warblers were once fairly common summer residents in northern Georgia. In the 1950's, Burleigh (1958) reported numerous records from several of the northern counties including Fannin, Dawson, Union, Towns, and Dade. However, today golden-winged warblers are considered extremely rare in the state. Between 1999 and 2003, north Georgia was systematically surveyed for golden-winged warblers to determine their status (Klaus 2006). Based on these extensive surveys, the Brawley Mountain area in Fannin County, Georgia has the only significant population of golden-winged warblers in the state.

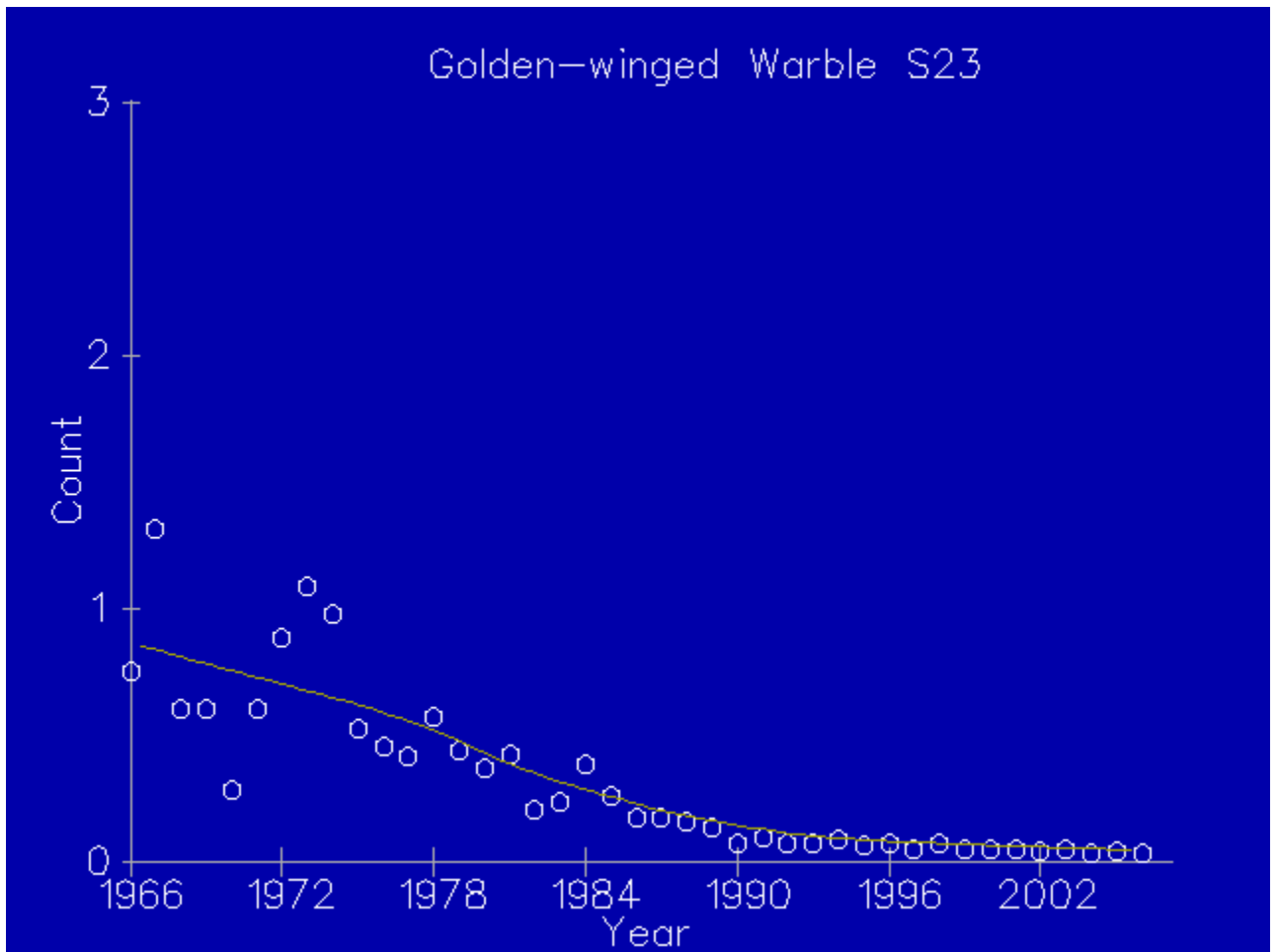


Figure 1. Breeding Bird Survey (BBS) trends for Golden-winged warbler in the Blue Ridge Mountains (1966-2006) (Sauer et al. 2007).

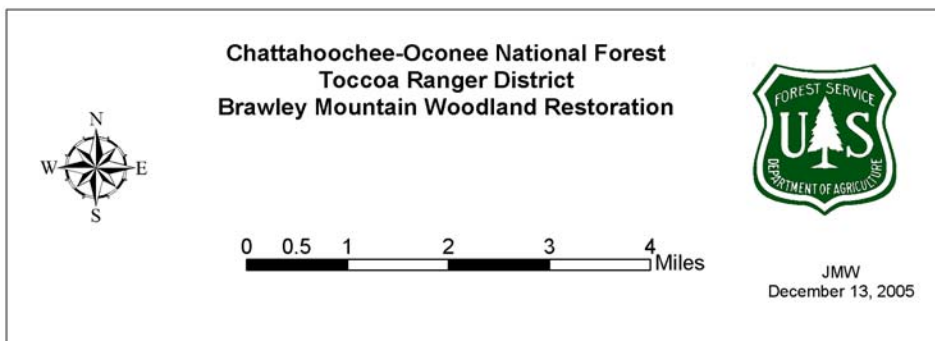
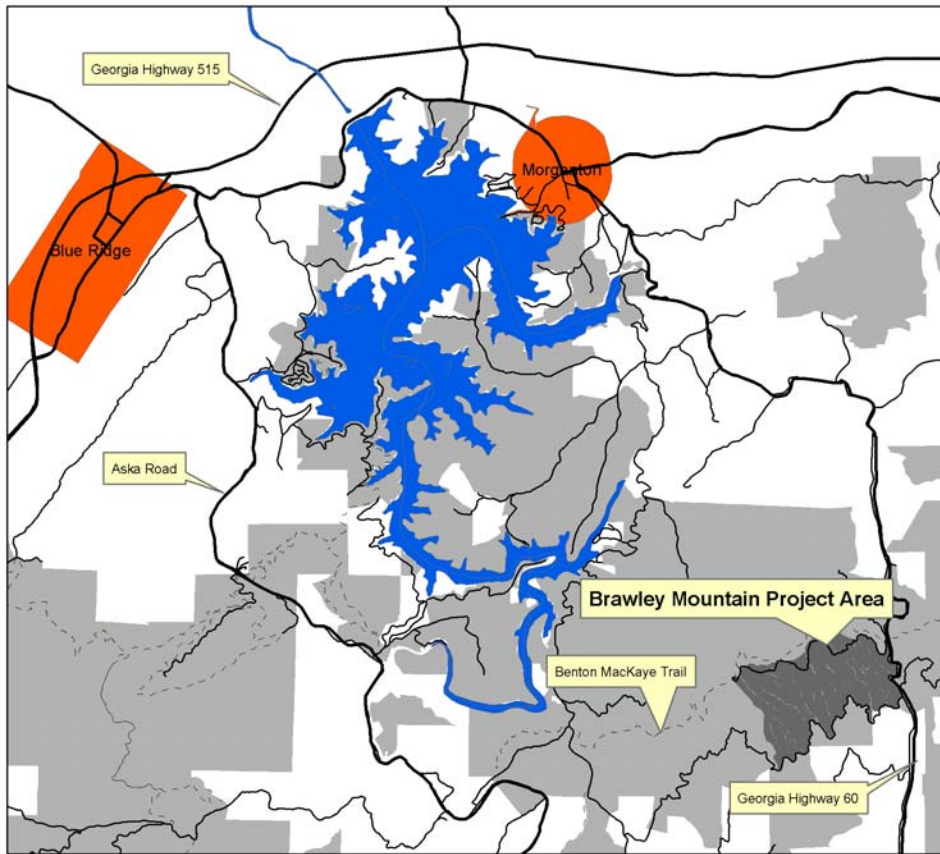


Figure 2. Location Map for the Brawley Mountain Project.

The breeding range of the golden-winged warbler is southern Canada, the Northeast and North Central United States, and the Appalachian Mountains south to the tops of the Blue Ridge Mountains of north Georgia. Breeding habitat is described as “*Deciduous woodland, usually in dry upland areas ..., woodland edge with low cover; hillside scrub; overgrown pastures; abandoned farmland; powerline right-of-ways; recently logged sites; bogs; forest openings; territories usually have patches of herbs and shrubs, sparse tree cover, and a wooded perimeter.*” (Confer 1992 as cited in NatureServe 2006).

‘Woodland’ has been defined as follows:

Woodland: Open stands of trees at least 6 m (20 feet) tall, with crowns often not interlocking; tree canopy discontinuous (often clumped), averaging between 66 and 40% overall cover; shrub layer often poorly developed or present only in gaps in the canopy. (NatureServe 2006))

An additional characteristic often used is a ground cover of mainly herbaceous species with grasses having more cover than broad-leafed herbs.

In addition to the golden-wing, there are also sixty-two other species of concern associated with it in the woodland habitat at the scale of the Blue Ridge portion of the Chattahoochee; though they are not each equally likely to occur on the Brawley Mountain project area. (Forest Service, 2004a) They are shown here to emphasize; (1) that we are dealing with a group of both plant and animal species associated with the woodland habitat, and (2) the golden wing is just one of many species in that group with viability concern. On the Forest, those shown here are either; (1) now known to occur only rarely, or (2) historically did occur, or (3) have some potential to be discovered in suitable habitat. Those with potential to be discovered could be vectored into suitable habitat by wind, birds or other natural mechanisms.

Among the birds, there are six species; the American kestrel, Bachman’s sparrow, northern bobwhite, orchard oriole, loggerheaded shrike, and brown-headed nuthatch.

An associated mammal of concern is the Southern Appalachian eastern woodrat.

There are four reptiles with viability concern; timber rattlesnake, corn snake, northern pine snake, and southeastern crowned snake.

There are six insects of concern; frosted elfin (historically reported from Georgia), the Barrens tiger beetle (not known but could occur), mottled duskywing, short-wing melanopus, Cherokee melanopus, and regal fritillary.

There are forty-six associated vascular plants of viability concern; purple false foxglove, Georgia aster, smooth purple aster, smooth blue aster, creeping aster, American barberry, Alabama grape fern, American bluehearts, Blue Ridge bindweed, Allegheny chinkapin, Indian paintbrush, tall thistle, small spreading pogonia, curlyheads, sweet fern, larkspur-leaved coreopsis, smooth coneflower, purple coneflower, slender wheatgrass, witch alder, teaberry, beardgrass, rough hawkweed, rough blazing star, Earle’s blazing star, Fraser’s loosestrife, sweet

piresap, nestronia, whorled mountain mint, Virginia mountain mint, dwarf chinkapin oak, early buttercup, Pursh's wild petunia, rose pink, nettle-leaf sage, large-flowered skullcap, white goldenrod, prairie goldenrod, spiked hoary-pea, pineland squarehead, Piedmont meadowrue, Appalachian golden banner, nettle-leaf noseburn, horse gentian, hairy blueberry, Eastern turkey beard,

An associated non-vascular plant is copper moss.

Beside the golden-wing warbler, other species without special viability concern are also associated with the open canopy, grassy-weedy-shrubby vegetation, and young forest conditions used by the golden-wing. Native grasses include the bluestems (several species), panic grasses, purpletop, switchgrass and Indian grass. Common herbs include goldenrod, asters, woodland sunflower, blazing star, blackberry and pokeberry. Birds using this type of habitat include indigo buntings, chestnut-sided warblers, yellow breasted chats, prairie warblers, chipping sparrows, mourning dove, field sparrows, turkey and ruffed grouse. Associated mammals include rabbit, field mice, shrews, fox, deer and bear.

Suitable habitat for the golden-winged warbler is extremely limited on the Chattahoochee National Forest. The suppression of wildfires and more recently, a decrease in active vegetation management has resulted in a substantial decrease in the amount of suitable habitat. Although historically more common, there currently is no inventoried woodland habitat on the Forest (USDA Forest Service 2004a). Only very small amounts of this community type exist in scattered fragments across the Forest.

The current golden-winged warbler habitat on Brawley Mountain is primarily a result of disturbance created by Hurricane Opal. In 1995 Hurricane Opal blew down both small groups and single trees on approximately 20 acres near the crest of Brawley Mountain, creating the open canopy that is one characteristic of woodland. The existing road and the associated powerline right-of-way also provided a narrow corridor of herbaceous vegetation. Soon after, salvaging of the blown down trees helped stimulate new herbaceous and woody seedling establishment and stump sprouting among the residual trees. Together with the open canopy and road/powerline right-of-way, salvage helped created the only known suitable habitat at the appropriate high elevation for golden-winged warblers in the Georgia portion of their historic range. This population, which consisted of about 3 territorial pairs in 2003, has grown to 12-15 pairs since then as a result of several prescribed burns and one wildfire. However, the very limited amount of suitable habitat appears to be saturated and this small number of individuals does not constitute a viable population. Unless this population is augmented by the creation of additional habitat, it is at risk for local extirpation in the future.

PURPOSE AND NEED FOR ACTION

The purpose of the project is to implement the 2004 Forest Plan by creating and then maintaining woodland habitat for its associated species with a specific focus on the golden-winged warbler.

The Brawley Mountain area was identified for woodland restoration because of the opportunity provided to both; (1) enhance habitat conditions for the existing golden-

winged warbler population, and (2) create additional habitat nearby for their expansion and the development of a larger population. Without these actions, the lack of additional suitable habitat at the appropriate elevation, isolation from other populations, and the small patch size makes the Brawley Mountain population highly susceptible to local extirpation. In addition, the quality of this small amount of habitat will steadily decline with time as forest re-growth changes the present structure from an open canopy forest of large trees with a seedling and sapling undergrowth back to a closed canopy forest with relatively few herbaceous plants.

Currently, there is a mixture of native warm season grasses, composites, and some fire hardy trees in portions of the project area which indicate historic presence of oak woodland. Native warm season grasses include bluestem (*Andropogon* spp.), Indian grass (*Sorghastrum nutans*), purpletop (*Tridens flavus*), and panic grasses (*Panicum* spp.).

Woodland creation will address several Plan wildlife habitat goals and one very specific wildlife habitat objective. Goal statements in the Plan were primarily derived from the Forest Service mission as embodied in various laws. Relative to wildlife habitat, the principle driving force is the requirement of the National Forest Management Act of 1976 that national forests provide for viable (self-reproducing) populations of native vertebrate animals. Specific applicable goals are:

Goal 1 – Contribute to the viability of native and other desirable wildlife species.

Goal 3 – Enhance, restore, manage, and create habitats as required for wildlife and plant communities, including disturbance-dependent forest types.

Objective 3.4 – Within the first 10 years of Plan implementation, restore 10,000 acres of open woodlands, savannas, and grasslands on the Chattahoochee and 1,000 acres on the Oconee, Once created, maintain woodlands, savannas, and grasslands on a five-year burning cycle or less.

Goal 4 – Maintain and restore natural communities in amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plants, fish, and wildlife species within the planning area.

Goal 19 – Contribute to the conservation of State-identified locally rare species in cooperation with the Georgia Department of Natural Resources

FOREST PLAN DIRECTION

The scope and purpose of this proposal is consistent with the 2004 Forest Plan goals. Desired Conditions for the applicable Management Prescription for the project area is summarized below.

The Brawley Mountain area is located within Management Prescription 7.E.1 Dispersed Recreation Areas. These areas receive moderate to high recreation use and are managed to provide a variety of recreational opportunities in a setting that provides quality scenery, numerous trails, and limited facilities. The management emphasis is to improve the setting for non-formal outdoor recreation in a manner that protects and restores the

health, diversity, and productivity of watersheds. The desired condition for this area is to provide a landscape that is naturally appearing with variations in native tree sizes and ages. The Benton MacKaye trail is located along the northern border of the project area. The proposed activities will result in the restoration of the area to a woodland condition.

The proposed treatments would help meet Forest Plan direction and would move this area toward the desired condition envisioned.

PROPOSED ACTION

The proposal is to restore woodland habitat on the south slopes of Brawley Mountain including the area from Brawley Mountain east to Wilscot Gap and includes the 3 main ridges and adjacent slopes between the Brawley Mountain road (FS 45) and Weeks Creek road (FS 35) to the south.

Several treatments would occur in sequence.

1. The current closed high canopy would be opened up by selecting, marking and removing some of the merchantable trees using a competitively-bid timber sale. Fire-tolerant tree species associated with this habitat type, such as blackjack oak, southern red oak, yellow pines and others will be favored to be left. Less fire tolerant species such as red maple and white pine will be selectively removed.

The timber harvest would be highly variable in numbers of trees cut depending on aspect, slope position, and landform (*see attached map*). No timber harvest would occur in portions of the area where slopes exceed 45%. The degree of canopy opening would be greatest on upper south and west-facing slopes and the adjacent ridgelines toward the east and south from the crest of Brawley Mountain. These are the locations where site quality and fire behavior would have historically acted in combination to produce woodland habitat. Ridges and upper slopes are water-losing (xeric) and sun-exposed locations with less productive potential than more moist locations down slope or in more terrain-shaded locations. Fires tend to increase in intensity upslope as pre-heating of fuels by convection and radiant heat transfer makes more and more fuel available to burn under any given burning conditions. While the canopy opening would be greatest on the more xeric locations, in order to create additional habitat more limited timber harvest also would occur in the mid and lower slope positions.

The range of would be about 20-percent post-sale high canopy cover on the ridge crests and upper slopes with south or west aspects, about 30 to 60-percent post-sale high canopy cover on mid slope position, and more than 60-percent post-sale high canopy cover in remaining areas. Only areas with 60-percent or less canopy cover would be considered part of the woodland condition in monitoring achievement of the woodland vegetative structure.

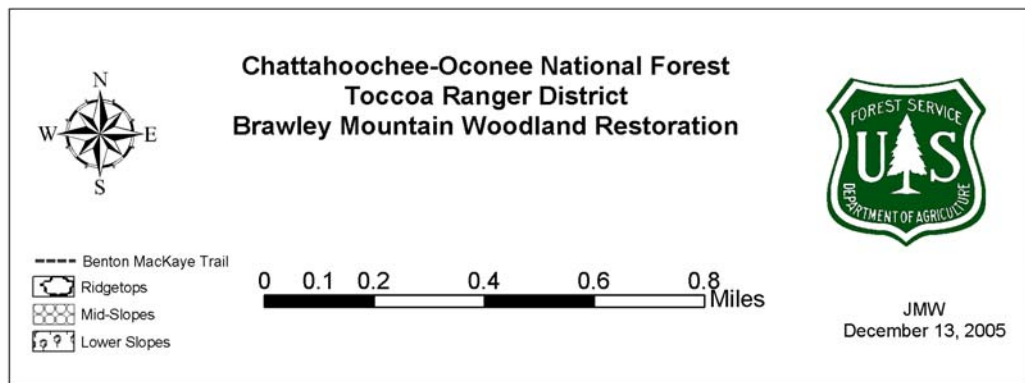
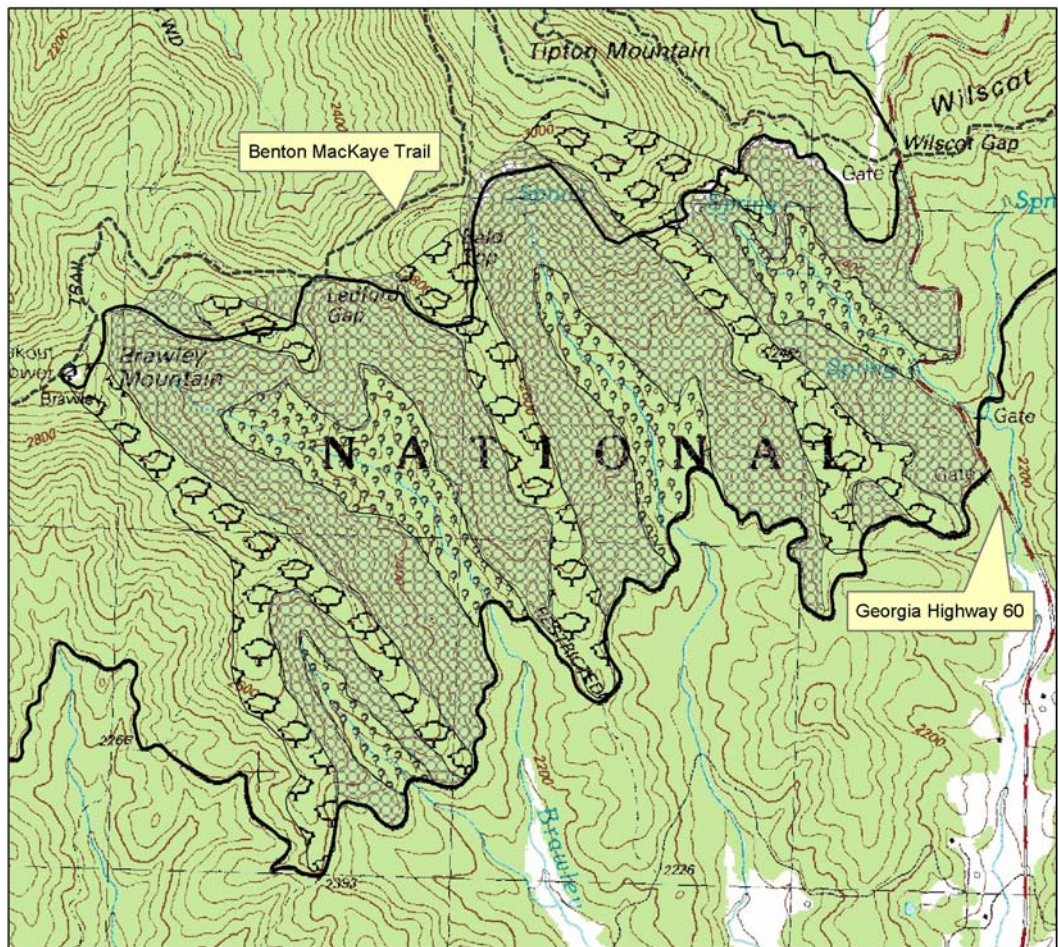


Figure 3. Proposed Action

2. The post-sale condition would be evaluated for ability to meet woodland canopy cover parameters. If on average across the upper slopes and ridge crests the residual canopy cover was too high in stems too large to be effectively top-killed by low to moderate intensity prescribed fire, a chainsaw felling in place of selected stems would be done to bring canopy cover (exclusive of small stems to be initially top-killed by fire and those reserved for snag creation) within woodland parameters.
3. The sale and any post-sale felling would be followed by low-to-moderate intensity prescribed fire. Ignition would occur by helicopter on the lower slope and the fire would be allowed to; (1) run up the slope to the crest, then 'lay down' (drop in intensity and speed of spread) on the lee slope, and (2) back down toward the streams at the base of the slopes. The burn would top-kill stems of most of low to medium fire tolerance species up to about 4" in diameter at 4.5 feet above the ground (dbh) on the upper slope and ridge crests. Some individual stems of fire intolerant species larger than 4" dbh would be also killed along the ridge crests. These larger stems would initially provide standing snags and then after they fell would provide large down woody material as further elements of wildlife habitat diversity.
4. An initial prescribed burn would be followed by a very selective herbicide treatment of some the stump sprout clumps arising from the root collar of top-killed hardwoods. This treatment would be focused on species other than hickories or oaks; primarily red maple, blackgum, sourwood and dogwood. The purpose would be to create habitat niches for the herbaceous species needed to complete the woodland condition.
5. As judged to be needed to achieve woodland conditions, supplemental seeding of native warm-season grass species would be done on an ash seedbed following a burn and/or on disturbed soil following the timber harvest. Experience has shown there will be a natural response of native grasses but the eighty years of fire exclusion will have reduced the seed bank on-site. Native grasses do now occur along the Brawley Mountain road banks and in the powerline right-of-way. Supplemental seeding will ensure more complete and more rapid native grass colonization.
6. Periodic low-to-moderate intensity prescribed burning on a 3 to 5 year cycle would be used to maintain the woodland condition by killing new hardwood seedlings and continuing to provide habitat niches for the establishment of native grasses.

Potential negative impacts to the Benton MacKaye trail would be mitigated in each activity.

Songbird populations will be monitored beginning after the sale and continuing for a period of at least 5 years to measure the response of these species to the woodland restoration activities. Pre-sale monitoring data collected by Georgia Department of Natural Resources personnel provides the baseline against which to evaluate success. A more widespread distribution of golden-winged warblers and associated species or increased populations in the habitat created will be the primary measures of success for this project; however response by any of the woodland associates would also be indicators of success.

DECISIONS TO BE MADE

The decisions to be made are: (1) whether or not the restoration of the native woodland community should be conducted at the proposed location at this time and – if so – (2) whether it should be by using the proposed treatments or other types of treatments. A related decision is what – if any – conditions will be imposed on the decision to create woodland as, for example, special (those in addition to Plan requirements) project mitigations to further reduce localized effects to some resource.

PUBLIC INVOLVMENT- ISSUE IDENTIFICATION

The proposed project was originally developed by a Forest Service and Georgia Department of Natural Resources Interdisciplinary Team. As already stated, the driving force for the proposal has been the response of golden-wing to the habitat on Brawley Mountain and the conservation status of the golden winged warbler.

A letter detailing the projects was sent to 67 individuals, agencies and public organizations on December 15, 2005. (The project file includes a list of all agencies, persons and organizations contacted in the course of scoping and environmental analysis.) In addition, the proposal appeared in the quarterly Schedule of Proposed Actions for the Chattahoochee National Forest and posted on the Forest web site.

Field reviews of the project were conducted with representatives of the Benton MacKaye Trail Association, Atlanta Audubon, and Georgia Forest Watch. These on site meetings were conducted to clarify the project proposal and activities and discuss issues and concerns.

An Interdisciplinary Team (ID Team) was formed and included the following specialists: Jim Wentworth (Team Leader, Wildlife Biology), Mary Yonce (Vegetation Management/GIS), Sheldon Henderson (Vegetation Management), (David Kuykendall) Recreation/Trails, Ron Stephens (Restoration Ecology/ Rx Fire), Nathan Klaus (Georgia DNR – Wildlife). Consultants to the ID team included: Dick Rightmyer (Soils), Charlene Breeden (Water), Becky Bruce (Cultural Resources), and Alison Koopman (Visuals).

ISSUES

Twelve individuals and groups responded to the scoping letter dated December 15, 2005. The ID Team reviewed public as well as internal comments, including those from ID Team members and others. Preliminary issues were analyzed and categorized as either significant to the proposal or insignificant to it. Those judged significant were used to; (a) design alternatives, (b) identify special mitigations (those in addition to any required already by the Forest Plan), (c) guide the intensity of effects analysis, or (d) all of these. Significant issues were recommended to the District Ranger, the responsible official for this project. A worksheet documenting this determination can be found in the project file. The four issues the Ranger approved as significant are listed below along with a brief discussion of each.

Significant Issues

1. **Project Scale** - The scale of the project is too large given the uncertainty of the outcome and '*experimental nature*' of the project. (Georgia ForestWatch, Benton MacKaye Trail Association, Southern Appalachian Biodiversity Project)

The project scale is strongly influenced by the effective habitat patch size for the golden-winged warbler, fire behavior, feasible terrain for ground-based logging and the locations of fire control lines that will avoid bare soil exposure near streams. The project proposal was designed to provide a sufficient quantity of habitat to provide for a sustainable population of golden-winged warblers. We do not regard the project as experimental because: (1) woodland conditions have been created and maintained at other national forest locations throughout the South by these, or similar, treatments and (2) the bird has already shown that it will occupy suitable habitat by being present on the project area.

2. **Visual Impacts** - The project will result in unacceptable negative visual impacts as seen from the Benton MacKaye Trail and the Brawley Mountain system road. (Georgia ForestWatch, Benton MacKaye Trail Association)

Standard mitigations of the Forest Plan to protect visual quality apply to this project and will be used in project implementation. These are designed to avoid unacceptable negative effects. Project activities will only be visibly from the portion of the Benton MacKaye trail near Ledford Gap. Special project mitigations for the visual resource will be identified by the visual resource effects analysis and made a part of the decision.

3. **Impacts to PETS species** - The project may indirectly negatively impact Proposed, Endangered, Threatened, or Sensitive (PETS) species known to occur or other PETS species with the potential to occur in the project area. (Georgia ForestWatch, Southern Appalachian Biodiversity Project)

Standard Forest Service procedure to ensure conservation of PETS species is to assess the potential for effects and do field surveys as necessary to locate them. If any are found, direct impacts to them are avoided. However, it is appropriate to consider the nature, extent, and probability of indirect effects to PETS that might occur in the future as a result of the project but would not occur without it and – if an unacceptable risk is identified – to make modifications as needed to mitigate the risk back to an acceptable level.

4. **Impacts of Herbicide use** - The use of herbicides (glyphosate, triclopyr, and imazapyr) may negatively impact human health, wildlife and fisheries, water quality, and non-target plants. (Georgia ForestWatch, Southern Appalachian Biodiversity Project)

The registration of an herbicide for forestry use by the US EPA demonstrates that the herbicide itself, when used according to label directions, does not pose an unacceptable level of human health or environmental risk. The Forest Service has a complete system to ensure all pesticides of whatever type are applied consistent with labeling. However, it is appropriate at individual project scale to respond to concerns about the match of the herbicide to site conditions, application methods and amounts, timing of application, target species, purpose(s) of application, and mitigations to avoid unintended consequences. Herbicide use would be very selective on this project, focusing on treatment of individual stump sprout clumps on the ridgetop, upper slope, and mid-slope areas. There would be no herbicide application along the Benton MacKaye trail, in riparian areas or within 60 feet of any PETS or locally rare plants. These items will be further addressed in effects analysis.

Non-Significant Issues

The following issues were identified by the I.D. Team as non-significant because they meet one or more of the following conditions:

- The issue is outside the scope of the proposal.
- The issue is already decided by law or in the Forest Plan.
- The issue is not in conflict with the proposed action.
- The issue is not supported by scientific evidence.
- The issue is limited in duration, extent, or intensity.

1. **Inappropriate objective** – Some comments questioned the creation of woodland specifically for golden-wing warbler. Reasons given included; (1) extreme edge of breeding range, (2) hybridization with blue-winged warbler, and (3) potential northern shift in response to global warming. There is also skepticism by some that woodland is anything other than an ephemeral habitat type created by Euro-American white colonization and that this period of both extensive and intensive environmental effects - many of which were negative – is a poor choice for any

type of ‘restoration’ effort. (Georgia Forest Watch, Southern Appalachian Biodiversity Project)

This issue has already been decided by the viability requirement of NFMA and by the Forest Plan. The viability requirement of NFMA is specifically scaled to the ‘*planning area*’. In our case that is the Chattahoochee-Oconee NF which is also coincident on its northern boundary with the state line of Georgia. The Forest Plan established the objective of restoring woodland habitat on the Forest.

2. **Invasive species** – A concern of some members of the public is that the activities of logging and burning will result in the spread of non-native invasive species (NNIS); especially Japanese stiltgrass (*Microstegium vimineum*) and privet. (Georgia Forest Watch, Benton MacKaye Trail Association, Southern Appalachian Biodiversity Project)

The woody NNIS such as Chinese privet will be treated during the post-sale herbicide application. There currently are just a few scattered individuals of these species present in the project area that should be effectively controlled with herbicides. Repeated prescribed burns as is proposed for this project also have been shown to be effective in controlling privet.

Japanese stiltgrass currently is widely distributed in the project area. Primary habitat is mesic sites such as ditches, floodplains and wetlands, forest and stream edges, as well as shaded roads and trails. However, ground disturbing activities will be limited in the mesic areas which will reduce the potential for spread of stiltgrass into these areas. In addition, late season prescribed burning as is proposed in this project may help control the spread of stiltgrass.

This issue is limited in intensity.

3. **Illegal ATV use** – A comment was that logging roads, skid trails, or dozer-constructed fire lines would become ATV trails, including accessing the Benton MacKaye Trail. (Georgia Forest Watch, Benton MacKaye Trail Association)

Project-specific mitigation will be used to; (1) break the connection with any ATV access points such as the Brawley Mountain road, and (2) ensure that activities do not create potential ATV access to the Benton MacKaye.

With such mitigation, this issue is not in conflict with the proposed action.

4. **‘Damage’ to BM Trail from prescribed burning** – One scoping response was that prescribed burning would kill trees along the BMT, opening up the canopy and causing negative effects to the trail visual quality along with increased maintenance need and costs. (Benton MacKaye Trail Association)

The comments assume either that; (1) the trail will be used as a fireline, or (2) the burn will be across the trail. Standard recreation and visual mitigations of the Forest Plan will avoid these effects.

With such mitigation, this issue is not in conflict with the proposed action.

5. **Old growth** – A scoping response was that; (1) the proposed treatments would eliminate stands that potentially could meet criterion for being existing old growth from old growth, or (2) would prevent stands that could soon reach old growth from becoming old growth. (Georgia ForestWatch, Benton MacKaye Trail Association, Southern Appalachian Biodiversity Project)

Provision for old growth per Region 8 policy was fully integrated into the Forest Plan. There is no burden on each project area to identify and retain all existing or potential old growth. Plan requirements for old growth in addition to that allocated by the Plan decision applies only at the 6th level hydrologic unit scale, a much larger scale than this project area. In addition, field data collection verified that none of the stands affected by tree removal in the proposed project met the minimum age criteria to be old growth.

This issue has already been decided by the Forest Plan.

6. **Use of fire, including a frequent fire regime** – Scoping comments included the position that the use of fire in the Southern Appalachians is '*poorly understood*' and may not be the appropriate means to create and maintain woodland habitat. (Georgia ForestWatch, Benton MacKaye Trail Association, Southern Appalachian Biodiversity Project)

The Forest Service disagrees with the statement that fire is poorly understood. No credible evidence was produced with the comments to support this view. There is a large and growing body of scientific literature about the role of fire in landscape ecology. Experience in the Southern Appalachians since the earliest days of scientific forestry have shown that woodland and grassland reverts – usually rapidly - to closed-canopy forest without mechanisms to keep it open. Fire is the only mechanism we know, prior to Euro-American land clearing for agriculture or grazing, that reliably would both; (a) occur, and (b) retard forest succession. Fire return intervals for maintenance must be frequent enough to preclude seedlings or sprouts from reaching a fire-resistant size. The presence of numerous woodland-associated species with an ancestry that extends back much further than Euro-American land use makes it self-evident that such habitat existed over millennial.

This issue is not supported by scientific evidence.

7. **Appropriateness of site** – A comment questions the appropriateness of the site(s) involved for a woodland creation. The argument is that while woodlands may have occurred 'somewhere' they did not – or should not – occur in the Blue

Ridge. If they must occur in the Blue Ridge they should not be on productive ‘hardwood’ sites. (Georgia ForestWatch, Benton MacKaye Trail Association, Southern Appalachian Biodiversity Project)

The appearance of golden-wing warbler in response to Hurricane Opal, salvage logging, and prescribed burning has already decided this issue. We wish to expand the habitat adjacent to existing habitat. Ridge crests and upper slopes are the most suitable locations from a productivity, fire behavior, terrain, and water quality stand point.

This issue is outside the scope of this proposal.

8. **Inconsistent with Forest Plan** – A comment suggests that the proposal is not consistent with the Forest Plan (Georgia Forest Watch)

The NFMA requires that projects be consistent with the Forest Plan. Any activities brought to decision in this proposal will be checked to see that they are consistent with the Plan. If they were not, they would be modified as need be until they were. Any decision made on this proposal will include the ‘finding’ that the activities of the decision are consistent with the Forest Plan.

This issue is not in conflict with the proposed action.

9. **Economic impacts** – One comment suggests that the project will disrupt recreational activities such as hunting, fishing, and hiking and affect the economy of the county (Georgia Forest Watch).

This position assumes that; (1) all effects will be negative, and (2) a very small-scale project can affect an entire county economy. No credible evidence is offered to support this assertion. Forest Service experiences over years both with and without a strong timber program do not support the idea that our projects, singly or in their aggregate, significantly affect recreation visits. The allocations of the Forest Plan were made, in part, to provide a complete spectrum of recreation settings and activities at large scale independent of setting changes at individual project level.

This issue is not supported by scientific evidence.

10. **Hard mast production** – One comment expressed concern that cutting oaks will decrease hard mast production (Georgia Forest Watch).

As described, all of the project area will retain tree cover. The open canopy conditions will allow oak crowns to expand outward and deepen vertically, increasing flowering and fruiting of residual trees. In addition, research has shown that fruiting is under at least moderate genetic control and that some trees are

never good acorn producers even in otherwise good to excellent mast years so that it is not correct that the cutting of each oak tree lowers mast production.

Mature mast producing stands are abundant on the Brawley Mountain area and Forest as a whole. Mast producing stands (>40 years-old) comprise nearly three-fourths (800 acres) of the analysis area and over half (4700 acres) of 6th-level watershed where the project will occur. There are nearly 200,000 acres of mast producing stands on the Blue Ridge Ranger District (64% of the forested acres) and over 400,000 acres on the Chattahoochee National Forest (56% of forested acres). Projects such as this may reduce mast-capability in a very localized area but the availability of mast will remain abundant on the Forest.

This issue is limited in intensity.

11. **Monitoring** – A comment indicated that the project should include a monitoring plan to measure and document changes in vegetation and {unspecified} soil parameters (Georgia Forest Watch).

Standard Forest Service procedure includes monitoring for achievement of objectives. These include post-burn monitoring, vegetation composition monitoring, and implementation and effectiveness monitoring of mitigation measures.

This issue is not in conflict with the proposed action.

CHAPTER 2 ALTERNATIVES

ALTERNATIVES TO THE PROPOSED ACTION

Alternatives to the proposed action were designed to respond to the major issues. The ID Team considered five preliminary alternatives. Three of these along with the proposed action (Alternative 2) were carried forward for detailed analysis (see project file for detailed documentation). These alternatives are described below:

Alternative 1 (No Action)

None of the proposed actions in Chapter one would take place. Several Forest Plan Goals and Objectives would not be met and would have to be met at another location on the Forest (Table 2). This alternative would respond to all the issues by not doing the actions that prompted the issues (Table 3).

Alternative 2 (Proposed Action)

Refer to Section earlier titled “**PROPOSED ACTION TO MEET THE PLAN**” in Chapter 1 for a complete description of the initial proposal (Fig. 3).

Alternative 3

This alternative would confine the woodland restoration to upper-mid south and west-facing slopes and the adjacent ridgelines toward the east and south from the crest of Brawley Mountain (Fig. 4). The sequence of activities would be the similar to the Proposed Action but would be confined to the ridges and upper slopes only. Timber harvest, chainsaw felling, prescribe burning, selective herbicide use and supplemental seeding would occur as described in the Proposed Action (Chapter 1). Except for prescribed burning, no activities would occur in the lower slope areas.

As in the Proposed Action, potential negative impacts to the Benton MacKaye trail would be mitigated in each activity.

Alternative 4

This alternative also would confine the woodland restoration to upper-mid south and west-facing slopes and the adjacent ridgelines toward the east and south from the crest of Brawley Mountain (Figure 4). The area involved and the sequence of activities would be the similar to Alternative 3 except that no herbicides would be used. Timber harvest, chainsaw felling, the initial prescribed burning, and supplemental seeding would occur as described in numbers 1, 2, 3, and 5 in the proposed Action (Chapter 1). Except for prescribed burning, no activities would occur in the lower slope areas. In this Alternative, herbicides would not be used to control stump sprout clumps to create habitat

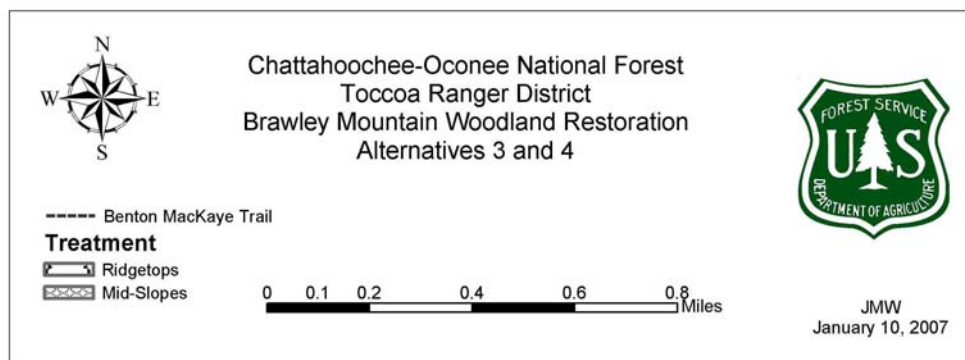
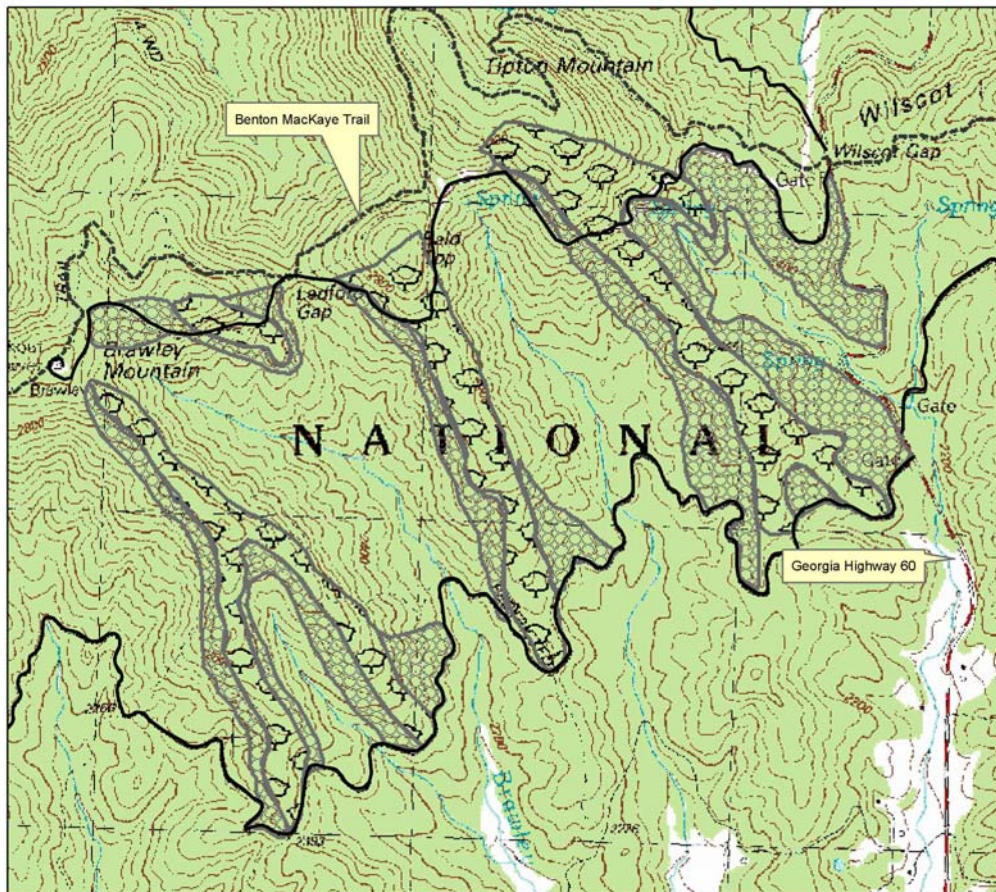


Figure 4. Alternatives 3 and 4.

niches for the herbaceous species. Instead, more frequent prescribed burning would be used to maintain the woodland condition. At least initially, periodic low-to-moderate intensity prescribed burning on a 2 to 3 year cycle would be used to control new hardwood seedlings and continuing to provide habitat conditions for the establishment of native grasses.

As in the Proposed Action, potential negative impacts to the Benton MacKaye trail would be mitigated in each activity.

MITIGATION MEASURES AND MONITORING COMMON TO ALL ACTION ALTERNATIVES

Mitigation measures are defined as actions taken to avoid, minimize, reduce, eliminate, or compensate for adverse effects of implementing the Proposed Action or other action alternatives. Mitigation measures for the protection of soil, water, recreation, wildlife and vegetation include directions and standards found in the Land and Resource Management Plan for the Chattahoochee-Oconee National Forest, January 2004. As such, these standards are incorporated into the design of the proposal and alternatives as mitigation measures.

Additional mitigation measures were developed by Forest Service resource specialist to reduce possible adverse effects. They include:

1. No timber harvest will occur within 100 feet of the Benton MacKaye Trail in order to maintain the existing canopy cover along the trail.
2. All prescribed burning activities will be carried out with approved prescribed burn plans that only allow burning under conditions that will have little impact on adjoining private resources. Smoke management procedures will be followed.
3. No timber harvest will occur at Ledford Gap, south of FDR 45, for a distance of 50' in order to preserve a vegetative buffer which will block any potential views from the Benton MacKaye Trail southward towards harvest activities.
4. No timber harvest is to occur within 100' of State Road 60 in order to preserve the integrity of the scenic road corridor.
5. Mitigation measures for herbicide use are listed Appendix A.

Monitoring:

The timber sale phase of the project will be monitored by a District Timber Sale Administrator to ensure that Forest-wide standards and timber sale contract guidelines are followed. In addition, field reviews will be conducted by District and Forest-level staff to ensure that the appropriate Forest Service standards and mitigation measures are

implemented and that these measures are effective in protecting soil productivity, water quality, and other resources as they were designed to do.

Bird data will be collected using standard point count methodology (Hamel et al. 1996) Points will be surveyed annually for at least the next five years by staff from the Georgia DNR Nongame Conservation Section and USFS along four fixed transects, twenty points in the restoration area and twenty outside the restoration area (control) along the same ridge to the east. Changes in bird species composition and abundance will be compared between the restoration site and the untreated control. Three years (2005-2007) of pre-treatment bird survey data has already been collected. Vegetation sampling will track changes in the plant communities in both control and treated sites. Sampling will occur along bird count transects such that changes in the vegetation community can be correlated with trends in bird presence/absence. Permanent sampling plots will be established to quantify basal area, canopy cover, residual tree species, seedling tree species, herbaceous species diversity, and percent cover of shrubs, forbs, native grasses, native legumes, and invasive species.

COMPARISON OF ALTERNATIVES

The alternatives are compared on how well they meet Forest Plan Goals and how well the issues are addressed and analyzed. The effects of the alternatives are disclosed in Chapter 3 of the EA. Table 1 compares the proposed action and alternatives in terms of treatment acres and methods. Table 2 compares the proposed action and alternatives in terms of how they meet Forest-wide Goals and Objectives. Table 3 compares the proposed action and alternatives in terms of how they address the major issues.

Table 1. Comparison of Alternatives in Terms of Approximate Treatment Acres and Methods

	ALT. 1 No Action	ALT. 2 Proposed Action	ALT. 3	ALT. 4
Ridge Tops	0 acres	200 acres	180 acres	180 acres
Mid-Slopes	0 acres	395 acres	215 acres	215 acres
Lower Slopes	0 acres	140 acres	0 acres	0 acres
Total	0 acres	735 acres	395 acres	395 acres
Herbicide Use	NO	YES	YES	NO

Table 2: Comparison of Alternatives in terms of their ability to meet Forest-wide Goals and Objectives.

FOREST-WIDE GOAL/OBJECTIVE	ALT. 1 No Action	ALT. 2 Proposed Action	ALT. 3	ALT. 4
Goal 1 – Contribute to the viability of native and other desirable wildlife species.	NO	YES	YES	YES
Goal 3 – Enhance, restore, manage and create habitats as required for wildlife and plant communities, including disturbance-dependent forest types.	NO	YES	YES	YES
Objective 3.4 – Within the first 10 years of Plan implementation, restore 10,000 acres of open woodlands, savannas, and grasslands on the Chattahoochee...	NO	YES	YES	YES
Goal 4 – Maintain and restore natural communities in amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plants, fish, and wildlife species within the planning area.	NO	YES	YES	YES
Goal 19 – Contribute to the conservation of State-identified locally rare species in cooperation with the Georgia Department of Natural Resources	NO	YES	YES	YES

Table 3: How the Alternatives Address the Major Issues

ISSUE	ALT. 1 No Action	ALT. 2 Proposed Action	ALT. 3	ALT. 4
Issue 1 – The scale of the project is too large given the uncertainty of the outcome and “experimental nature” of the project.	0 acres treated	735 acres treated	395 acres treated	395 acres treated
Issue 2 – Probability the project will result in unacceptable negative visual impacts as seen from the Benton MacKaye Trail and Brawley Mountain System road.	None	Low	Low	Low
Issue 3 – Probability project implementation may adversely impact PETS species.	None	Low	Low	Low
Issue 4 – Probability the use of herbicides may negatively impact human health, wildlife and fisheries, water quality, and non-target plants...	None	Low	Low	None

ALTERNATIVES CONSIDERED BUT NOT FULLY DEVELOPED

The interdisciplinary team and the responsible official considered two other alternatives. These alternatives are discussed below as well as the reasons for eliminating them from detailed study.

One alternative considered, based on comments received from the Georgia Chapter of the Ruffed Grouse Society, was to modify the proposed action to include more significant canopy reduction (>80%) in the lower slopes and riparian areas. This

modification would provide additional benefits to ruffed grouse and other early successional species. Woodland habitat conditions are associated with highly variable canopy conditions with the most significant canopy opening on the xeric ridge tops and upper slopes and much more limited on the more mesic slopes and riparian areas. Significant canopy reduction in the lower slopes and riparian areas is not consistent with the purpose and need of the project to create and maintain woodland habitat. For this reason this alternative was dropped from further study.

The second alternative considered was to scale back the project to include only portions of stands on the central and eastern ridges (approximately 100 acres +/-). This was based on comments received from Georgia Forest Watch, Southern Environmental Law Center, and the Georgia Chapter of the Sierra Club. The scope of this alternative was considered to be too limited to provide a significant contribution to meeting the Forest Plan Goals and Objectives for woodland restoration and golden-winged warbler conservation. For this reason this alternative also was dropped from further study.

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

PHYSICAL ENVIRONMENT

Element – Soils

Measure – soil productivity

Bounds of Analysis: The temporal bound used for cumulative effects on soil productivity is three to five years; the spatial bound includes all soils where management activities are proposed.

Existing Conditions:

The Brawley Mountain project area is situated within the Southern Blue Ridge Mountains Ecological Subsection (M221Dc) and the Lake Blue Ridge Landtype Association (M221Dc015). Landform and topography in these ecological units is characterized by low mountains with broad, rolling ridges underlain by mica schist geology. Valley bottoms along large creeks and rivers have broad stream terraces; however none occur within the project area. Within the Brawley project area elevations range from 2200 along Brawley Branch to over 3000 feet along the Brawley Mountain crest. Average annual precipitation within the Landtype Association is about 60 inches with an average annual temperature of 60° and an estimated growing season of 200 frost-free days. North slopes are relatively cooler and damper, while south and west facing slopes tend to be warmer and drier. Slope gradients range from 10 to 60 percent, with lower gradients along the ridge crests and valley floors near streams.

Soils within the Brawley Mountain project are generally deep and well drained with subsoil textures ranging from loam to clay. Soil depth over bedrock is typically more than sixty inches thick on the sideslopes and in cove positions. Depth of soil material often becomes shallower along ridges, such as near the crest of Brawley Mountain, with soil over bedrock 20 to 40 inches thick. Evidence of these shallow depths can be observed in the area of the old rock quarry on FS Road 45.

Soil inventory information is excerpted from the Fannin-Union Counties Soil Survey, published cooperatively by the USDA Natural Resources Conservation Service and the Forest Service in 1996. Field surveys were conducted by soil scientists from these agencies from 1980 to 1990 with National Forest lands surveyed by Forest Service soil scientists. Field visits to examine current soil conditions in the project area, identify compaction sensitive areas, slope breaks and other soil interpretations needed to design management activities were completed in May and September 2006.

Soils of the Brawley Mountain project area have been classified into five soil mapping units. Five soil series are named as components of the mapping units:

Bradson – occurs in lower slopes along stream terraces and valleys

Clifton – found on low ridges and lower slope positions

Cowee – on mid-slopes and upper side slopes

Evard – on mid-slopes and upper side slopes

Saunook – on lower slope positions and low ridges

Soil mapping units are identified as complexes, with at least 2 soil series named due to the nature of the landscape geology and topography. This is common in montane topography with long side slopes and ridges. Soil properties, landscape positions, existing condition of soil units, and the associated management implications or precautions of these soil units were analyzed with respect to the effects of proposed practices in each alternative. The specific soil mapping units are identified in the table below with slope gradient, acres/percentage in the project area, and the interpreted soil erosion and compaction hazard.

Table 4. Soil Mapping Units Found in Brawley Mountain Project Area

Soil Map Unit Name & Map Unit Symbol	Slope Gradient Range	Acres in Project Area	% of Project	Harvest Equipment Operability	Soil Compaction Hazard	Soil Erosion Hazard
Bradson loam – BrE	10 to 25	46	6	Moderate	Moderate	Moderate
Clifton-Evard complex - CIE	10 to 25	68	9	Moderate	Moderate	Moderate
Cowee-Evard complex - CxF	25 to 45	480	65	Moderate	Moderate	Moderate
Cowee-Evard complex - CxG	45 to 60	75	10	Poor	Moderate	Severe
Saunook-Evard complex - SaE	10 to 25	69	9	Well	Moderate	Moderate

None of the soil mapping units in the Brawley Mountain project area is subject to flooding. There are also no jurisdictional wetlands, source water intakes or prime farmlands within the project area. For additional information concerning these soil map

units and additional management interpretations, reference the Soil Survey of Fannin and Union Counties, Georgia, on file in the Forest Supervisors office.

Effects on Soils

Soil Erosion. Soil erosion is recognized as potentially the most serious, direct form of damage to soil productivity. Soil can be permanently lost and soil particles physically moving from a site may result in sediment delivery to nearby streams impacting water quality and possibly compromising aquatic habitats. Ground, or soil, disturbing management practices have the greatest potential to cause erosion, principally because they remove vegetative ground cover and often concentrate and channel surface runoff water. Research has shown that access routes and systems, along with impact areas of log decks and primary skid trails are the most common causes of accelerated erosion that occur in forested watersheds. In addition, erosion rates will tend to remain greater on these areas for one to three years following their use due to altered soil structure and loss of infiltration and until vegetation cover is restored.

A soil's susceptibility to erosion varies by soil type and position on the landscape. A slight or moderate erosion hazard indicates that standard erosion control measures such as installing waterbars plus seeding and fertilizing firelines and not exposing more than 15 to 25 percent of mineral soil in treatment areas are sufficient to prevent excessive erosion. Soils with severe erosion hazard ratings require more intensive efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity.

Approximately 10 percent of the proposed treatment acres within the project area have a severe erosion soil rating (Cowee-Evard complex, CxG). Mitigation measures proposed for all action alternatives to minimize soil erosion would be followed in accordance with the Forest Plan and Georgia's Best Management Practices for Forestry.

Soil Compaction. Compaction, or soil rutting, increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration caused by the operation of heavy equipment used in forestry operations. One of the major soil concerns when operating heavy equipment in the forest is soil compaction; the primary method to minimize this impact is to operate equipment on designated routes during drier soil moisture periods. Compaction can detrimentally impact both soil productivity and watershed condition by causing increased overland flow during storm events. Plant growth can be reduced due to a combination of factors including lower amounts of water entering the soil and its reduced availability to plant growth, a restricted root zone, and reduced soil aeration. It is generally acknowledged that all soils are susceptible to soil compaction or decreased soil porosity. Soils in the Brawley Mountain project area are most susceptible to compaction or rutting when wet.

Within the project area Bradson soils are rated severe, the most susceptible to soil compaction or rutting, primarily due to the slope position where they occur (moisture gaining) and the dominant soil texture (clayey in upper foot). A severe rating indicates that soils will easily compact when soil moisture is at or above soil moisture field

capacity. The remaining soils in the project have a moderate rating for soil compaction. This indicates that under most field conditions compaction will not be a problem, but may occur when soil moisture content is at or above field capacity. Mitigation measures proposed for all action alternatives to minimize compaction would be followed in accordance with the Forest Plan, generally restricting equipment operations when soils are saturated.

Soil Displacement. The use of large machinery in forestry operations may affect soil productivity by soil displacement. Soil displacement is described as the horizontal movement of soil from one place to another by mechanical forces such as a blade, wheel slippage, or dragging logs. Displacement has negative effects on productivity because it removes the area of highest concentration of organic matter and nutrients from soil and significantly reduces soil biological activity.

Soil Nutrients (organic matter). Loss of soil nutrients can occur directly from soil erosion, soil displacement, or indirectly by biomass removal from harvesting timber, or from fire. The most effective way of managing soil organic matter is through effective management of the forest floor and woody debris. Nutrient depletion, however, is generally a concern where soils are initially nutrient poor, where whole-tree harvest (total biomass removal) is used, or where stand rotations are very short, i.e. on the order of 20 to 35 years (Jorgensen and Wells, 1986). None of these factors apply in this project area, or from proposed management actions being considered.

A large portion of the total nutrient supply of the forest ecosystem is contained in the forest floor (duff layer) and decaying woody debris. These materials are important because they are the reservoir for soil organic matter and short- and long-term nutrient supply. The forest floor and decaying woody debris also serves to improve soil infiltration, aeration, and retention of soil moisture, and provide needed habitat to support soil microbial activity for the forest ecosystem.

Prescribed Fire Effects on Soil. Prescribed fire has both favorable and adverse effects on soil. Favorable effects are temporarily enhanced nutrient availability and phosphorus cycling and reduced soil acidity (FEIS-Appalachian Mountains, IV-90). Adverse effects include excessive soil heating that can kill soil biota, alter soil structure, destroy organic matter, and loss of site nutrients through excessive volatilization. Soil erosion and additional nutrient loss through leaching may occur during rainstorms. Negative effects are principally related to the severity and frequency of the burn.

High intensity burns, more typical during wildfires, can adversely affect long-term soil productivity. Such things as excessive nutrient loss from the site through atmospheric volatilization and deep leaching, loss of soil organic matter and even soil structure and reduced infiltration rates can be seriously compromised, further leading to accelerated erosion rates.

Management actions, however, have been proposed to conduct prescribed burns in properly managed conditions to produce a low to moderate fire intensity. During

prescribed burning actions sufficient amounts of unburned material would be left to minimize erosion. Burns would be implemented such that not more than 15 percent bare soil would be exposed on units receiving fuels reduction or wildlife habitat burns. Soil exposure occurs primarily within bladed fire control lines. Dormant season underburns every 3 to 5 years pose minimal risks to soil quality on most sites (FEIS-Appalachian Mountains, II-B-22) would result in little to no detectable change of the structure of mineral soils because the elevated temperatures in the soil would be less and of brief duration (i.e. the fire would not stagnate in one spot for long periods of time). Light to moderate-severity burns would expose soil on less than 20 percent of the area and vegetative recovery would usually take one year or less. Soil biota would also be temporarily reduced but would recover quickly.

The proposed prescribed burns would occur every 3 to 5 years during the dormant season and be of low to moderate intensity. Some of the prescribed burns would occur on slopes greater than 35 percent. Only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves and small twigs should be consumed. This would leave the underlying layer, which consists of more decomposed needles, leaves and twigs, to protect the soil from excessive nutrient loss. This organic layer, along with the trees and other living vegetation on the site, would also serve to prevent or minimize any soil movement.

Herbicide Use Effects on Soils. Herbicides may affect soil productivity through biotic impacts, soil erosion, and nutrient leaching. Depending on application rate and soil environment, herbicides can stimulate or inhibit soil organisms. Adverse effects can occur when herbicides are applied well above label rate. Where adverse effects have been observed, herbicide concentrations exceeded those measured under actual operational conditions. There is, however, a general consensus that herbicide usage at normal forestry rates does not reduce the activity of micro-organisms, and therefore produce no adverse effects on site and soil productivity (Neary and Michael, 1989).

Use of herbicides will not disturb the soil surface, so treated areas will have intact litter and duff that minimizes the potential for accelerated erosion. Nitrogen loss from erosion and leaching will also be minimal and should not exceed 14 lb/acre. The overall nitrogen budget over a timber rotation period is positive and results in a long-term nitrogen buildup. Overall, the risk to reduced long term soil productivity from herbicides is minimal. The herbicides selected for use in the project area would not be directly applied to the soil. Proper application procedures and timing are critical in ensuring minimal effects to the soil.

Effects of Alternatives on Soils

Alternative 1: No Action

This alternative proposes no treatment actions within the project area.

Direct and Indirect Effects

Erosion: This Alternative would result in the least amount of direct erosion. Only undisturbed natural erosion would be expected to continue, along with erosion from the existing system roads in place. Current levels of road use, along with regular maintenance, would minimize erosion from the road prism. A significant indirect effect due to the implementation of this alternative would be the effects that a wildfire could have to soil productivity in the project area. Under this scenario, the No Action Alternative would represent the most detrimental situation as existing high fuel loadings along with more limited fire suppression equipment access into this area would equate to the most acres that could be affected by wildfires.

Compaction and Displacement: No soil disturbing activities would be planned in the No Action Alternative. Therefore, there would be no direct or indirect effects on the soil from implementation of this alternative as no heavy equipment use would be planned.

Nutrient Loss: The No Action alternative would result in no direct nutrient depletion. However, in the event of a wildfire the nutrient loss could well be the most excessive of any of the four alternatives. Under this alternative a wildfire would be expected to impact the most acres as a high severity level. In the event of a wildfire, the excessive amount of nutrient depletion would make this alternative the worst of the four analyzed when taking account the indirect and cumulative effects that would occur.

Considering only direct effects, the existing trends would continue. The No Action Alternative would be considered the least effective in terms of maintaining long term soil productivity.

Cumulative Effects

No cumulative effects would result from past projects, e.g. 1995 storm salvage of timber, as these past projects were completed more than 10 years ago and no effects remain. No other future actions are proposed during the temporal and spatial bounds used for the project area.

Alternative 2: Proposed Action

Refer to the Proposed Action description in Chapter 1 for a detailed discussion of the proposed treatments. Treatments would occur on approximately 735 acres of the Project Area. Eighty percent of the area to be harvested is proposed on ridge crests and mid-slopes (595 acres).

Direct Effects

Erosion: Under this Alternative the primary areas of concern for erosion would be use and maintenance of system roads FS 45 and 35, temporary roads, log landings, skid trails,

and fire control lines for the prescribed burns planned after the commercial timber harvest. Roads 45 and 35 are both suitable for access with minimal changes to surfacing, alignment, drainage and width. Approximately two (2) miles of each system road will be used for a total of about four (4) miles. These roads are permanent roads with about two (2) acres of graveled surface in the four miles. FS Road 35 (Weeks Creek Road) has several short segments in need of pre-sale maintenance to correct drainage problems and add gravel on the travel surface. Temporary access routes, about 1.5 miles, are in place from 1994 storm salvage operations, generally following the ridge crests and upper side slopes. The slopes and soils of these landscape positions are suitable for access routes, and development will require minimal excavation disturbance. Development and use of these temporary roads will disturb approximately 1.5 acres. Log landings will need to be developed within the treatment areas to concentrate logs for removal. Average size for a log landing is about one-quarter acre during operations. Efficient operations would require 3-4 landings for the proposed treatments. This would disturb about 1 to 1.5 acres for landings. Prescribed fire is proposed as a follow-up treatment after the harvest to develop and maintain woodland habitat conditions. Fire control lines will need to be developed following the completion of harvest operations, but would have repeat use for subsequent prescribed burns. Each of these soil disturbances (temporary roads, log landings, fire control lines) will be implemented under Forest Plan standards and Georgia's Best Management Practices for forestry to minimize erosion and loss of soil productivity within the project area. Areas of soil disturbance will be stabilized and restored to vegetation cover after use ends to minimize soil erosion. Monitoring has shown that these measures, when properly implemented, are effective at minimizing erosion. Implementing the Proposed Action Alternative, therefore, should result in no long term effect on soil productivity.

Compaction: The majority of the soils of the Brawley project area are rated with a moderate compaction hazard rating within proposed treatment areas. Bradson soils on the lower slope positions (46 acres) have a severe hazard rating for compaction. This rating is primarily due to low proportions of rock content in the top six inches of soil, and the clay content at this same depth. Most of the area with Bradson soils will be within riparian corridors, offering this mitigation of potential damage. This situation, when combined with heavy equipment operations on saturated soils, can result in unacceptable levels of compaction. Treatments on these soils will require attention to soil moisture levels during operating periods and adherence to Georgia's Best Management Practices for Forestry and Forest Service timber sale contract provisions related to wet period operations to minimize damage from compaction.

Soil Displacement: The proposed Action Alternative would result in some soil displacement from skidding of logs, and dozer constructed firelines, log decks, and temporary road construction. Where these actions are being dedicated to these uses for future management actions, soil displacement is acceptable. Implementing mitigation measures referenced in the Forest Plan and Georgia's Best Management practices for Forestry would result in displacement having only a minimal impact to soil productivity.

Nutrient Loss: Some short-term loss in nutrient resources is expected due to tree harvest and prescribed burning which results in some biomass removal, accelerated erosion, volatilization and deep leaching. These effects may continue for up to two years following project implementation. On the positive side, harvesting and prescribed burning will temporarily increase availability of nutrients resulting in improved vegetative growth during this same period.

All timber harvesting would result in the removal of tree boles only. The prescribed burns would be conducted every 1 to 4 years during either the growing or dormant season with a low to moderate intensity. This means that, in addition to the targeted fraction of 10-hour (1/2 " dbh) and larger fuels planned for consumption, only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves and small twigs would also be consumed. Most of the nutrient resources would remain onsite by leaving the underlying layer, which consists of more decomposed needles, leaves and twigs, intact and unburned. This remaining organic layer, along with the residual canopy position trees, unconsumed slash and other large woody debris and other living vegetation, would serve to minimize the temporary loss of the nutrient resources. Implementing this action alternative would result in no long-term effect on the soil nutrient resources.

Indirect Effects

Herbicides

Following an initial prescribed burn a very selective herbicide application of some of the stump sprout clumps is proposed. Herbicides proposed for this project area would be applied through foliar application and not soil application, the herbicides would result in little to no evidence of soil mobility or activity when correctly applied, and would therefore show negligible direct effects to the soil. The use of herbicides in this action alternative is expected to have positive effects on the availability of soil nutrients to the non-targeted vegetation.

Fire Effects and Soil nutrients: Long-term negative effects to the soil should be minimal under the proposed treatment of low to moderate intensity prescribed burns on a 3 to 5 year frequency. Typical burn intensity will be limited by established burning parameters and Forest Plan mitigation measures designed to protect soils and overstory trees and to minimize risk of escape. These parameters result in retention of enough leaf litter to protect soil from the negative effects listed above in most cases. Underburn frequencies will be one to four years or greater which would allow recovery of forest floors and soil biota and would not deplete soil nutrients.

With standard prescribed burning planning and mitigation, negative effects to soil productivity from prescribed fire under the proposed action alternative are not expected. This is because the burns would be light to moderate in severity and cool enough to protect overstory trees, and the lower portion of the litter layer would remain in place.

Cumulative Effects

No effects would result from past projects, e.g. 1995 storm salvage of timber, as these past projects were completed more than 10 years ago. No other future actions are proposed during the temporal and spatial bounds used for the project area.

The effect to long-term soil productivity as a consequence of those actions being proposed in this Alternative relates to the cumulative effects from erosion, compaction, displacement and the soil nutrients capital as noted above. By practicing a light hand on the land policy during all soil disturbance activities, by adhering to mitigation measures common to all action alternatives and following all applicable Forest Plan standards and Georgia's Best Management Practices for Forestry, long-term soil productivity would be maintained. In addition, fuel loadings throughout most of the project area would be reduced from timber harvesting and prescribed fire and the construction of temporary roads would improve access for fire suppression needs. These actions would reduce the probability of a future accumulation of fuels and wildfire hazard, which could impair long-term productivity.

Alternative 3

Direct and Indirect Effects

Direct and indirect effects of this alternative would be similar to the Proposed Action Alternative in terms of the effects to soil productivity. However, the areas proposed for treatment are reduced from 735 acres to 395 acres, dropping all treatments on the lower slopes in the project area and reducing treatment acres of the midslope positions by almost half. Treatment will occur on the ridgecrests and upper side slopes in the Project Area. The potential effects of soil erosion, compaction, displacement and nutrient loss would decline in proportion to the smaller acreage proposed for management treatments. This reduction in treatment acres will impact fewer acres by timber harvest, reduce the overall miles of temporary roads and skid trails, and require fewer log landings.

Cumulative Effects

No cumulative effects would result from past projects, e.g. 1995 storm salvage of timber, as these past projects were completed more than 10 years ago and no effects remain. No other future actions are proposed during the temporal and spatial bounds used for the project area.

The effect to long-term soil productivity as a consequence of those actions being proposed in the Proposed Action Alternative relates to the cumulative effects from erosion, compaction, displacement and the soil nutrients capital as noted above. By practicing a light hand on the land policy during all soil disturbance activities, by adhering to mitigation measures common to all action alternatives and following all applicable Forest Plan standards and Georgia's Best Management Practices for Forestry,

long-term soil productivity would be maintained. In addition, fuel loadings throughout most of the project area would be reduced from timber harvesting and prescribed fire and the construction of temporary roads would improve access for fire suppression needs. These actions would reduce the probability of a future accumulation of fuels and wildfire hazard, which could impair long-term productivity.

Alternative 4

Direct and Indirect Effects

Effects of Alternative 4 would be the same as described for Alternative 3 with the exception of the deletion of herbicide application on stump sprouts in Alternative 4.

Cumulative Effects

Cumulative effects of Alternative 4 would be the same as described for Alternative 3.

Element - Water

Measure: Acres of Disturbance

Bounds of Analysis:

Spatial - The project is located within the Toccoa River (upper) Watershed Management Area (or 5th level HUC). The entire project is located within one 6th level HUC, which is 060200030104. The spatial bounds for cumulative effects purposes is a subwatershed that begins where Brawley Branch leaves NFS land and enters private land (for the second time). This is the best stream reach to evaluate cumulative effects, because the stream is large enough to evaluate an existing fishery on NFS land. Fisheries are the most common beneficial use on the NFS land.

Temporal – current conditions through the next five years.

Existing Conditions:

The project area is located in the headwaters of Brawley Branch and an unnamed tributary of Pigeon Creek. Brawley Branch is a tributary of Pigeon Creek, and Pigeon Creek is a tributary of the Toccoa River. The project area is located in the ‘Toccoa River – upper’ watershed management area or 5th level HUC #0602000301 (see Forest Plan, page 4-17). It is further mapped in the 6th level HUC #060200030104.

All stream types, including ephemeral, intermittent and perennial, are included in the project area. Table 5 lists miles of stream by order for the proposed action and action alternatives. Most of the stream miles are order 1, which are typically ephemeral and intermittent stream types. Both of these stream types are connected to larger perennial

streams, forming the stream network. Ephemeral streams are important to ecosystem dynamics of perennial streams, because they are part of the same connected stream network. These headwater streams typically have closed vegetative canopies that provide allochthonous inputs to the stream continuum. They have no defined channel and flow in response to precipitation with runoff. Ephemeral streams do not typically have a water influence zone with unique vegetation and soils that are found adjacent to perennial and intermittent streams. Therefore, ephemeral streams are protected with forest-wide standards instead of management prescription 11 for perennial and intermittent riparian corridors (USDA Forest Service 2004b). Intermittent streams have a well-defined channel and stream flow during wet seasons of the year, but not the entire year.

The upper end of the project area, downslope of FS 45, has steep slopes forming the beginning of ephemeral channels. These ephemeral channels continue for several hundred feet before quickly transitioning into intermittent or perennial channels. In the Blue Ridge Mountains, ephemeral channels often transition directly to small perennial channels due to rainfall, geology and landform. After a few hundred feet of steep slopes, the upper end of the project area has gentler slopes, with less energy and defined perennial channels begin.

Table 5. Total estimated stream miles by order for Proposed Action and Alternatives.

	Order 1 miles	Order 2 miles	Order 3 miles	Total Miles
Proposed Action (Alt 2)	8.7	2.5	1.0	12.2
Alternatives 3 & 4	4.0	0.1	0	4.1

Source: Chattahoochee-Oconee NF GIS data set (03/2007)

The perennial streams in the project area include Brawley Branch and an unnamed tributary of Pigeon Creek. Each of the named perennial streams identified in the project area have an assigned water use classification, or beneficial use of fisheries. The streams have been further classified as primary trout waters by the Georgia Department of Natural Resources (Georgia Rules and Regulations for Water Quality Control, Chapter 391-3-6, Georgia Dept Nat. Resour. 2003). No streams within the project area are currently identified as partially supporting or not supporting on the Georgia 305(b)/303(d) listing maintained by the GA DNR Environmental Protection Division.

Landforms in the project area are typical of the Southern Blue Ridge Mountains, including low mountains with broad, rolling ridges underlain by mica schist geology. As mentioned above, there are steep areas at the upper end of the project area forming ephemeral streams. Some steep areas form inoperable inclusions within the project area. No timber harvest would occur in portions of the project area where slopes exceed 45%, see table 6.

Table 6. Acres by Slope Class within the Project Area.

Slope Class	Description	Acres
1	0 – 25	226
2	26 – 35	196

3	36 – 45	178
4	> 45	133

Source: Chattahoochee-Oconee NF GIS data set (03/2007)

For most forested watersheds, sediment is the most troublesome pollutant and roads area major source of that sediment. Sediment can adversely impact water quality by increasing turbidity, affecting channel morphology, altering substrate size/distribution, and altering temperature. These direct affects result in loss or reduction of instream habitat. There are several road segments that are either in the project area or that form part of the boundary of the project area. These roads include State Route 60, FS 45, and FS 35. Total road miles by road type are listed in table 7. State highway 60 is a paved route. The road on the upper end of the project area is FDR 45 and is in good condition. On the lower end of the project, FS 35 travels through private land for a short distance and then onto NFS land. FS 35 road prism currently lacks proper drainage features, has ‘mud holes’, and is in need of maintenance. Some road segments are currently causing active erosion of the soils or roadbed, and contributing to indirect stream effects, including sedimentation and loss of aquatic habitat.

Table 7. Miles of Road in the Project Area or Forming Part of the Project Area Boundary

	OML	Lanes	Surface Type	Miles in PA or Forming part of PA Boundary
FS 45	3	1	Crushed Aggregate or gravel (AGG)	2.5
FS 35	3	1	Improved Natural (IMP)	2.8
State Route 60		2	Paved	0.8

Source: Chattahoochee-Oconee NF GIS data set (03/2007)

Effects of Alternative 1 (No Action)

Treated Acres - 0

Direct and Indirect Effects- Road conditions for FS 35 will continue to deteriorate unless maintenance is completed. Road runoff will continue down the roadbed causing rutting and down cutting of the roadbed. This rutting is resulting in concentrated flows of water in the roadbed. In some cases, the road is essentially functioning as a stream or connected to the stream network. When this condition exists, indirect effects include loss of aquatic habitat as fine sediment fills interstitial spaces between larger substrate. This sedimentation will also alter channel morphology by filling in pools and changing overall substrate distribution (i.e. more small or fine particles downstream of crossings).

Cumulative Effects – No cumulative effects from past projects, including hurricane Opal. Timber salvage activities took place more than 10 years ago. No other future actions are proposed.

Effects of Alternative 2 (Proposed Action)

Treated Acres – 735

Direct and Indirect Effects- The proposed action includes 735 treatment acres with a series of treatments taking place, including timber harvest, chainsaw felling, prescribed burning and the use of herbicides. Soil erosion is a direct effect of project implementation activities. Soil erosion begins with the direct effect of soil exposure as a result of some ground disturbing activity. Mineral soil is exposed when the organic root mat and duff layer are removed from the natural soil profile. Soil particles then become loosened by the energy of falling rain and become runoff. See Soil Element for further discussion about erosion and associated effects.

Ground disturbances associated with timber harvest include construction and use of skid trails and log landings, as well as road improvements for portions of the existing road system. Effects of these ground disturbing activities would be greatest in areas of steep slope, but ground disturbing activities will not be taking place on all 735 treated acres. For example, approximately 133 acres within the project area have slopes > 45%, and no timber harvest would occur in these areas (but other treatments like prescribed burning could occur). On treatment acres with 35-45% slopes, excavated side-hill skid roads would need to be constructed. On treatment acres with 25-35% slopes, overland ground-based skidder systems can still be used, but there will be some mineral soil exposure as equipment goes up and down slope. See table 6 for the number of acres by slope classes for the project area. Although harvest can occur on slopes up to 45%, direct and indirect effects of these activities will be minimized with the use of Best Management Practices and Forest Plan standards. No new permanent or temporary roads are proposed.

Constructed firelines are the primary ground disturbing activity associated with prescribed burning. The project area boundary includes three existing roads, which would minimize the need for constructed firelines. Road maintenance and improvements will reduce current erosion from FS 35. Adding surface materials, drainage structures and reshaping will minimize erosion during harvest activities. This will in turn reduce indirect effects of sedimentation.

Effects from skid trails, log landings and constructed fire lines are short in duration and minimized by use of Best Management Practices (i.e. proper location and construction). These activities are also guided by the revised Land Management Plan. The Plan includes direction for perennial and intermittent streams through management prescription 11 – Riparian Corridors. Forest-wide standards in chapter 2 have guidance for ephemeral streams, herbicide use and a range of other management activities.

Indirect effects of erosion include sedimentation and the loss of aquatic habitat as fine sediment fills interstitial spaces between larger substrate. Sedimentation will also alter channel morphology by filling in pools and changing overall substrate distribution (i.e. more small or fine particles downstream of crossings).

Herbicides – Herbicide treatment would include foliar application to stump sprouts in this alternative. Treatment would occur mostly on upper slopes. There will be no herbicide treatment in riparian corridors for perennial and intermittent streams, but possibly within ephemeral zones. After treatment, relatively small quantities of herbicide could enter ephemeral channels during a major storm event. Since ephemeral streams flow only in response to rain events, any excess herbicide from drift would most likely be absorbed into the ground before entering the stream system through a storm event.

Drift of herbicides into surface water is influenced by application method, the existence of buffers and weather conditions. Some drift will likely occur in foliar, and less so by basal bark or injection method applications, and is greater in broadcast than by stem specific, selective treatments. Drift decreases as droplet size increases, or when granular from chemicals are used (FEISVM IV-98). The revised Land Management Plan includes several forest-wide standards for mitigation of herbicide effects. FW-025 states that only aquatic-labeled herbicides may be used selectively within 25 feet of ephemeral streams.

Treatment with herbicides will be selective and have low or no risk to aquatic systems in this alternative.

Cumulative Effects – Past projects include prescribed burns in the project area in 2003 and 2005. These burns included approximately 1 mile of constructed fire line. There have been no other ground disturbing activities within the last 5 years. Following hurricane Opal, which occurred in 1995, salvage timber removal operations took place in the project area. These operations included the use of skid roads and log landings, but recovery from these ground disturbances has occurred, and there are no current sediment contributions from these activities. No future actions are proposed during the next five years in the project area.

Effects of Alternative 3

Treated Acres – 395

Direct and Indirect Effects- Alternative 3 includes 395 treatment acres with a sequence of activities similar to the Proposed Action but would be confined to the ridges and upper slopes only. Timber harvest, chainsaw felling, prescribed burning, and selective herbicide use would occur as described in the Proposed Action, but on a reduced number of acres. This reduction in treatment acres will impact fewer acres by timber harvest, reduce the overall miles of temporary roads and skid trails, and require fewer log landings. Except for prescribed burning, no activities would occur in the lower slopes. Stream types on upper slopes would be primarily ephemeral streams, but still include small perennials. The treatment area for this alternative includes approximately 4.0 miles of order 1 stream and 0.1 miles of order 2 stream. See table 5 in the affected environment section for a summary of stream miles associated with all alternatives.

There would be less potential for erosion and sedimentation in this alternative than in the Proposed Action, because the treatment acres are reduced. See effects

summary for the Proposed Action, above. Ground disturbing activities would still include skid trails, log landings and constructed firelines.

Herbicides – See effects summary for the Proposed Action, above.

Cumulative Effects - Past projects include prescribed burns in the project area in 2003 and 2005. These burns included approximately one mile of constructed fire line. There have been no other ground disturbing activities within the last 5 years. Following hurricane Opal, which occurred in 1995, salvage timber removal operations took place in the project area. These operations included the use of skid roads and log landings, but recovery from these ground disturbances has occurred, and there are no current sediment contributions from these activities. No future actions are proposed during the next five years in the project area.

Effects of Alternative 4

Treated Acres – 395

Direct and Indirect Effects- Alternative 4 includes 395 treatment acres with a sequence of activities similar to the Proposed Action but would be confined to the ridges and upper slopes only. The area involved and the sequence of activities would be similar to Alternative 3, except no herbicide would be used.

Effects would be similar to alternative 3, except there would be no herbicide effects.

Cumulative Effects – Cumulative effects for Alternative 4 would be the same as described for Alternative 3.

Element – Scenery

Visual Quality Analysis

This section will disclose the effects from project activities on the Landscape Character and the Scenic Integrity Objective (SIO) as determined in the Forest Plan Revision using the Scenery Management System (SMS).

The SMS makes use of scenic classes based on the relative value and importance of the landscape to the viewing public, on a scale of one through seven. Scenic classes have been derived by combining the scenic attractiveness of the area (which includes landscape character and existing scenic integrity) with landscape visibility (which includes concern levels, distance zones, and travel way importance). Areas are assigned a Scenic Integrity Objective (SIO) from Low to Very High based on its scenic class designation and management prescription. The highest scenic integrity ratings are given to those landscapes which should have little or no deviation from the character valued by

constituents for its aesthetic appeal, keeping in mind that human alterations can sometimes raise or maintain integrity.

Bounds of Analysis:

The geographic bounds for this analysis will include effects of actions on the scenic quality from typical observer positions, including primary travel ways and any significant use areas within or nearby the project areas, such as the Benton MacKaye Trail. The temporal bounds for this analysis consider the short-term and immediate impacts which result from active timber management activities such as harvesting, skidding and hauling, and up to 10 years in the future, since most vegetation manipulation that causes visual contrasts in this area is largely subordinate to the viewer after this time period.

Existing Conditions:

The Brawley Mountain Woodland Project Area falls within the Blue Ridge Ranger District of the Chattahoochee National Forest. It is located approximately 6 miles due east and 5 miles due south of the town of Blue Ridge, Georgia. It is easily accessed via U.S. Highway 76 to State Road 60 to Forest Service Development Roads 45 and 35.

The majority of the project area is located within Forest Plan prescription 7.E.1., Dispersed Recreation Areas. All riparian corridors fall under prescription 11, Riparian Corridors.

The landscape character goal envisioned for 7.E.1., Dispersed Recreation Areas is *natural appearing*. According to the Forest Plan, the management emphasis is to improve the settings for non-formal outdoor recreation in a manner that protects and restores the health, diversity and productivity of the watersheds. Such areas will be managed and monitored to absorb moderate to high levels of use. The predominant landscape is natural appearing with variations of structurally diverse mid- to late-successional communities. Up to 4 percent of forested land may be in early-successional forest conditions, whether created naturally or by human interaction. A visually-appealing landscape may be achieved by providing vista openings, featuring special attractions like rock outcroppings and waterfalls, and by providing park like stands and a diversity of vegetation species and age classes. Management changes are designed to be low-contrast with pre-treatment conditions. However, openings for wildlife can be expanded and created. Some openings may provide permanent shrub/sapling habitats as a result of longer maintenance cycles.

Areas under management prescription 11, Riparian Corridors Prescription, are managed such that ecological processes and functions are retained, enhanced and/or restored within riparian corridors.

Visitors choose the project area's natural appearing, mountain setting to engage in a variety of popular recreation activities including: hiking, hunting, sightseeing, driving for pleasure, camping and backpacking. Approximately 2.5 miles of the Benton MacKaye

Trail traverses the project area from Wilscot Gap at State Highway 60 to Brawley Mountain and beyond, attracting local and regional visitors.

Because of the relative location of the project area to other natural surrounding features and its limited approaches into the area, only a select number of trails and roads provide short and long-range views of the affected landscape. The list below identifies travelways and use areas nearest the proposed project area to be considered for evaluation based on their potential viewpoints and views of the affected landscape.

Affected Travelways:

State Road 60, a primary travel way

Forest Development Road 45, a secondary travel way

Forest Development Road 35, a secondary travel way

Benton MacKaye Trail, a primary recreational travel way

To quantify and map affected scenery and related recreation settings within the project areas, Geographic Information System (GIS) computer technology was employed and field surveys were conducted.

Effects of Alternative 1 (No Action)

Direct/Indirect Effects:

If no action is taken conditions will remain as they are now and progress unrestrained. With the exception of the corridor of road bank along Forest Development Road 45 and an adjacent power line right-of-way which are maintained on a regular basis, forest conditions will continue to mature, and be unrestricted. Any gradual scenery changes over time would not be noticeable to forest users visiting the Benton MacKaye Trail and additional travel routes, as identified above, considering the slow course of natural vegetative change.

Effects Common to the Proposed Action:

Direct/Indirect Effects:

Restoration of woodland habitat is proposed to occur across approximately 730 acres of national forest bound by Brawley and Tipton Mountains, Forest Development Road 35 and State Road 60. Restoration efforts would be conducted primarily on south and west facing slopes and ridgelines, but would extend from upper slopes to lower slopes, including coves and riparian areas. Tree canopy reduction would be variable depending on aspect, slope and landform. Elevation of these stands range from 2200' – 3000', roughly.

The most dramatic change to the landscape would occur on approximately 200 acres of south or west facing ridge tops and upper slopes where it is proposed to be thinned to an average residual basal area of 15 square feet per acre. The landscape created by this treatment and maintained through a regular regime of moderate intensity prescribed fire

once every 4-5 years, would be highly noticeable to casual forest visitors along the Benton MacKaye Trail and along Forest Development travel routes, without mitigation. Users would notice a more open forest canopy, with increased sunlight, and increased visual penetration into the understory. The first year, following controlled burning, scorched or black earth and dead and browned vegetation would be perceptible. Forest visitors would hear the sounds of distant treatment activities, or see the occasional logging truck leaving the area during initial project implementation. However, such effects would be short term.

In addition to these more drastic changes, moderate levels of tree canopy reduction (40-70%), roughly equivalent to an average residual basal area of 55 square feet per acre, would occur along the mid-slopes (approximately 400 acres) and limited tree canopy reduction (<30% or an average residual basal area of 80 square feet per acre) would occur in the lower slopes.

The above mentioned activities are proposed to occur within areas of Moderate (all project area south of FDR 35) to High (all project area north of FDR 35) Scenic Integrity Objectives (see the Visual Quality Analysis Map). Implementation of mitigation measures can be employed to meet the minimum SIO requirements for those seen areas. However, based on Geographic Information Systems (GIS) mapping and field observations, much of the project area is not visible as foreground, middle ground or background. This is due to the project area location among other relative high points, and its limited access and observer positions within the surrounding area. Though, it is critical to note that certain stands are visible from observer locations along the Benton MacKaye Trail, FDR 35 and 45, and State Road 60 for varying distances up to 2 miles. Any modifications to the landscape will affect the visual quality along such travelways. This is of particular significance for immediate foreground areas along State Road 60 and the Benton MacKaye Trail, both classified as primary travelways. For these primary travelways with a High Scenic Integrity Objective, the potential to create noticeable deviations from the desired landscape character is unavoidable, and therefore certain mitigation measures must be implemented to protect the scenic attractiveness along these corridors.

As identified in Chapter 2, no timber harvest is to occur within 100 feet of the Benton MacKaye Trail in order to maintain the existing canopy cover along the trail.

In addition, no timber harvest is to occur within 100' of State Road 60 in order to preserve the integrity of the scenic road corridor.



Photo Point 2: View from State Highway 60 looking south from the entrance of FDR 45

Lastly, no timber harvest is to occur at Ledford Gap, south of FDR 45, for a distance of 50' in order to preserve a vegetative buffer which will block any potential views from the Benton MacKaye Trail southward towards harvest activities.



Photo Point 4: View from the Benton MacKaye Trail at Ledford Gap looking south

The potential for high elevation areas within the project site to be seen from State Road 60 is only evident from one position along the road, located approximately .5 mile west from the intersection of State Road 60 and Skeenah Gap Road (as identified on Visual Quality Analysis Map). From this viewpoint, only a small portion of the project area can be seen, as highlighted below in red. However, when viewed from this distance (approximately 2 miles), the variable tree canopy structure, well-formed crowns and large trees should repeat the texture, form and color of the surrounding vegetation and would, therefore, be visually subordinate to the overall landscape character. Within a year after implementation, SIOs for this area should be met. For this reason, no further mitigation would be required.



Photo Point 1: View of Garland Mountain to Ledford Gap from State Road 60

Effects of Alternative 3

Direct/Indirect Effects:

Alternative 3 would confine woodland restoration to upper and mid south- and west-facing slopes and the adjacent ridgelines toward the east and south from the crest of Brawley Mountain. Activities would be similar as described in the Proposed Action; however no activities would occur in the lower slope areas. While fewer acres would be affected through this proposal, there would still be high potential for negative scenery impacts along the primary travelways, as described above. As identified for the Proposed Action, the same mitigation measures would need to be implemented along the Benton MacKaye Trail and State Road 60 to meet the Scenic Integrity Objectives for these areas.

Effects of Alternative 4

Direct/Indirect Effects:

Similar to Alternative 3, Alternative 4 would also confine woodland restoration to upper and mid south- and west-facing slopes and the adjacent ridgelines toward the east and south from the crest of Brawley Mountain. In this Alternative, herbicides would not be used. Again, while fewer acres would be affected through this proposal, there would still be high potential for negative scenery impacts along the primary travelways, as described above. As identified for the Proposed Action, the same mitigation measures would need to be implemented along the Benton MacKaye Trail and State Road 60 to meet the Scenic Integrity Objectives for these areas.

Cumulative Effects:

While the proposed actions would result in low to moderate to drastic changes to the landscape, mitigation measures would allow the proposed activities to occur without

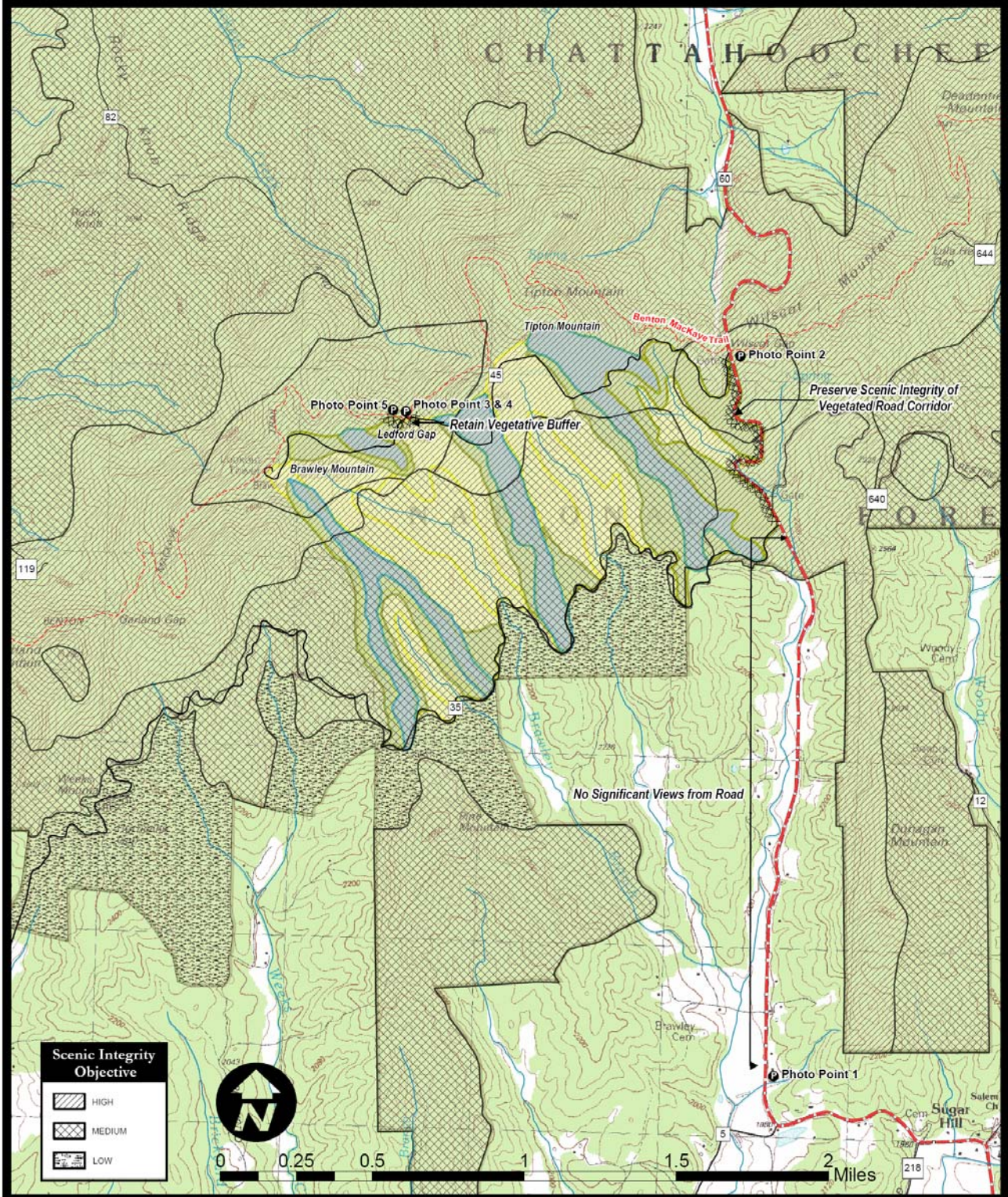
noticeable human manipulation. In addition, proposed activities would result in advantages to the scenery of the area, including the following:

- Increased opportunity for wildlife viewing and hunting opportunities
- Increased visual diversity within the forest
- Creation of a park-like woodland setting over time
- Decreased likelihood for a catastrophic fire event

The activities proposed for the Brawley Mountain project area would not significantly change the landscape character of the seen area. There are no other scenery improvement projects planned for this area at this time. Therefore, no further cumulative effects to scenery are expected.

Brawley Mountain Woodland Project

Visual Quality Analysis: Scenic Integrity Objectives & Photo Point Collection



***Photo Points correspond to photographs on preceding pages.*

Element – Cultural Resources

Measure: The measure of this effect is the number of sites found within the project area and their potential disturbance within the project area.

Bounds of Analysis:

Spatial - The spatial analysis for the Brawley Mountain project is the entire 800 acre project area.

Temporal – The time bound for this analysis would be during the proposed action, whereas the cumulative effects would be indefinite until another project is proposed in or near the same area. Monitoring of protected sites will continue after project completion as part of the Forest's heritage resources management, and sites found during this survey will be on record for future projects in the area.

Existing Conditions:

Existing Condition - Heritage resources are areas containing remnants of past human behavior that provide information about how people used and adapted to their environment over time. The Chattahoochee-Oconee is rich with heritage resources that provide a vast information base on the history and prehistory of northern Georgia. These resources range from 10,000-year-old artifacts and sites to CCC camps of the 20th century. All heritage resources are fragile and non-renewable, meaning they cannot be rebuilt or remade. Once damaged, the information they contain becomes irretrievable (Forest Plan). The prehistory and history of the Chattahoochee National Forest can be found in the 1994 Cultural Resources Overview for the forest (Wynn et al., 1994). Also, this background can be found in the new 2004 Forest Land and Resource Management Plan and Environmental Impact Statement for the Chattahoochee-Oconee National Forests (EIS 3-525) and previous reports noted below for the specific area around Brawley Mountain.

Our knowledge of the cultural resources within the Brawley Mountain area comes from current and previous surveys. A cultural resource survey was conducted during the fall and winter of 2005-2006. The survey covered the entire 800 acres as proposed. Two previous surveys in the area have resulted in two sites recorded within the proposed project area (Bruce 1996 and Price 1992). In consultation with the SHPO on those two previous reports, one site has been determined potentially eligible and one ineligible for the National Register of Historic Places (NRHP). During this current survey for this project, ten sites were recorded. Eight are recommended as ineligible for the National Register, one is recommended as potentially eligible and one is recommended as unknown until further work can determine eligibility. Of the total twelve sites recorded within the project area, three of these sites that are recommended for protection and they will be marked in the field prior to any ground disturbing activity. The other nine sites require no further work.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects – None of the proposed activities would take place. There is potential for heritage resources to be damaged by unplanned fire suppression activities due to fuel buildup.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – This alternative has the potential to effect heritage resources by ground disturbing activities. Commercial and non-commercial activities by mechanical means could impact heritage resources by disturbing intact cultural deposits. However, a cultural resource inventory of the entire 800 acres has been completed and sites identified for protection.

The potential for effects has been mitigated to an acceptable level by implementation of the standards in the current Land and Resource Management Plan, and identification and evaluation of historic properties, and mitigation measures established in consultation with the Georgia State Historic Preservation Officer. Historic properties eligible for or listed on the NRHP, including a protective buffer will be marked on the ground and avoided during project work.

Cumulative Effects – The combined effect of past, present, and future Forest Service activities is the ever-growing identification and protection of heritage properties and reports available to the scientific community. This information is necessary to provide an understanding of the natural and cultural history of the Forest in order to develop desired future conditions and to make informed land management decision and resource allocation.

Effects of Alternative 3

Direct and Indirect Effects- This alternative would confine the activities to the upper and mid slopes, however, this alternative would have the same effects as Alternative 2. The known sites and a protective buffer would be marked on the ground prior to any activities.

Cumulative Effects – The cumulative effects would be the same as Alternative 2.

Effects of Alternative 4

Direct and Indirect Effects- This alternative confine the activities to the upper and mid slopes, however no herbicides would be used. This alternative would have the effects as Alternative 2.

Cumulative Effects – The cumulative effects would be the same as Alternative 2.

BIOLOGICAL ENVIRONMENT

This section discloses effects to biological elements of the environment expected as a result of implementing the Proposed Action or alternatives. The biological environment includes the diversity of plant and animal communities, habitat components, and individual species of concern or interest. Analysis of effects to these elements is organized in this document following the framework used during forest planning (Forest Plan and FEIS). Use of this framework is designed to ensure comprehensive consideration of effects to the biological environment. Elements in this framework are listed in Table 8, where they are assessed for their relevance to this project. Only those relevant to the project are analyzed further in this document.

Table 8. Elements of the biological environment, derived from forest plan analysis, their relevance to the Brawley Mountain project, and whether they will be further analyzed in this document.		
Biological Element	Analyzed Further?	Relevance to this Project (Potential Effects of Concern)
MAJOR FOREST COMMUNITIES		
Mesic Deciduous Forests	Yes	Tree harvest and prescribed burning under some alternatives could change structure in existing mesic deciduous forest, also potentially affecting habitat abundance for associated species.
Eastern Hemlock and White Pine Forests	Yes	Tree harvest and prescribed burning under some alternatives would change structure in existing white pine stands, also potentially affecting habitat abundance for associated species.
Oak and Oak-Pine Forests	Yes	Tree harvest and prescribed burning under some alternatives would change structure in existing oak and oak-pine forests, also potentially affecting habitat abundance for associated species.
Pine and Pine-Oak Forests	Yes	Tree harvest and prescribed burning under some alternatives would change structure in existing pine and pine-oak forests, also potentially affecting habitat abundance for associated species.
Mixed Woodlands, Savannas, and Grasslands	Yes	Tree harvest and prescribed burning under some alternatives would begin the development of woodland conditions that currently are limited the area.
RARE COMMUNITIES		
Wetlands	No	Surveys of affected areas indicate no wetlands are present.
Glades and Barrens	No	Surveys of affected areas indicate no glades or barrens are present
Canebrakes	No	Surveys of affected areas indicate no canebrakes are present
Caves and Mines	No	Surveys of affected areas indicate no caves or mines are present
Table Mountain Pine	No	Surveys of affected areas indicate no table mountain pine forests are present
Rock Outcrops and Cliffs	No	Surveys of affected areas indicate no rock outcrops or cliffs are present
High Elevation Balds	No	Surveys of affected areas indicate no high elevation are present
Basic Mesic Forests	No	Surveys of affected areas indicate no basic mesic are present

SUCCESSIONAL STAGE HABITATS		
Successional Forests	Yes	Proposed activities under some of the alternatives could change the abundance of the various forest successional stages.
High-Elevation, Early Successional Forests	Yes	The majority of the project area is under 3000 feet elevation; however the proposed activities under some of the alternatives could create some early successional habitat conditions at higher elevations.
Old Growth	Yes	There is no existing old growth in the project, but harvest and prescribed burning under some of the alternative could affect future old growth
Forest Interior Birds	Yes	Tree harvest and prescribed burning under some alternatives could change habitat conditions for interior forest birds
Permanent Openings, Old Fields, Rights-of Way, Improved Pastures	Yes	Proposed management under some of the alternatives could change the condition of the existing powerline ROW, also potentially affecting habitat abundance for associated species.
SPECIAL HABITAT ATTRIBUTES		
Riparian Habitats	Yes	Tree harvest and prescribed burning under some alternatives would change structure in forested riparian habitats, also potentially affecting habitat abundance for associated species
Snags, Dens, and Downed Wood	Yes	Prescribed burning and reforestation treatments under some alternatives may also result in both loss and creation of snags. Changes in snag density would potentially affect abundance and quality of habitat for snag-dependent species.
Aquatic Habitats	Yes	Tree harvest and prescribed burning under some alternatives could affect aquatic habitat conditions
THREATENED, ENDANGERED, SENSITIVE AND LOCALLY RARE SPECIES	Yes	Some PETS and Locally Rare species are present or potentially present in affected areas. See section on these species for details on which of these species are relevant.
DEMAND SPECIES		
Black Bear	Yes	Tree harvest and prescribed burning under some alternatives would affect the amount of hard and soft mast for this species, potentially affecting population levels.
White-tailed Deer	Yes	Tree harvest and prescribed burning under some alternatives would affect the amount of browse and cover for this species, potentially affecting population levels. .
Ruffed Grouse	Yes	Tree harvest and prescribed burning under some alternatives would affect the amount of food and cover for this species, potentially affecting population levels.

The Forest Plan identifies 15 management indicator species to help indicate effects of management on some elements of this framework. A subset of these MIS is analyzed further in this analysis because their populations or habitats may be affected by the project (Table 9). For those species that also were MIS in the original 1985 Forest Plan (e.g. Acadian flycatcher, pileated woodpecker, white-tailed deer, black bear), much of the Forest-wide population and habitat data was compiled and analyzed previously (USDA Forest Service 2003). Most of the MIS in the revised Forest Plan are birds that are monitored annually through the Forest's breeding bird surveys (USDA Forest Service

2004c). In addition, La Sorte et al. (2007) have recently completed an analysis of breeding bird population trends on Southern National Forests (1992-2004), which included the MIS bird species. Population trends for all of the current MIS are summarized in the Management Indicator Species Population Trend Report for the Chattahoochee-Oconee National Forests (USDA Forest Service 2006).

Table 9. Forest-level management indicator species, their purpose, whether they are selected for project-level analysis, and reasons for their selection or non-selection, Brawley Mountain Project			
Species Name	Purpose	Analyzed Further?	Relevance to this Project (Potential Effects of Concern)
Prairie Warbler	To help indicate the effects of management on early successional forests	Yes	Prairie warblers occur in the vicinity of the project and management actions may affect the availability of early successional forest
Ovenbird	To help indicate the effects of management on Forest Interiors (Chattahoochee NF)	Yes	Ovenbirds occur in the vicinity of the project and management actions may affect the forest interior habitat
Wood Thrush	To help indicate the effects of management on Forest Interiors (Oconee NF)	No	Wood thrush was selected as a MIS for the Oconee NF, to help indicate the effects of management actions on forest interior habitat. The Ovenbird is used as the MIS for this habitat on the Chattahoochee NF.
Pileated woodpecker	To help indicate effects of management on snags.	Yes	Pileated woodpeckers occur in the vicinity of the project and management actions may affect the availability of snags.
Scarlet Tanager	To help indicate the effects of management on Oak Forest	Yes	Scarlet Tanagers occur in the vicinity of the project and management actions may affect the structure of oak forests
Hooded Warbler	To help indicate the effects of management on mid -late successional mesic deciduous forest	Yes	Hooded warblers occur in the vicinity of the project and management actions may affect the structure of mid-late successional mesic deciduous forests
Chestnut-sided Warbler	To help indicate the effects of management on high elevation early-successional Forests	Yes	Chestnut-side warblers occur in the vicinity of the project and management actions may affect the availability of high elevation early successional forests
Pine Warbler	To help indicate the effects of management on Pine, Pine-Oak Forest	Yes	Pine warblers occur in the vicinity of the project and management actions may affect the structure of pine forests.
Acadian Flycatcher	To help indicate the effects of management on Mid-Late Successional Riparian Habitats	Yes	Acadian Flycatchers occur in the vicinity of the project and management actions may affect the structure of forested riparian habitats.
Field Sparrow	To help indicate the effects of management on woodland, savanna and grassland communities	Yes	Field sparrows occur in the vicinity of the project and management actions may affect the availability of woodland conditions.
Swainson's Warbler	To help indicate the effects of management on early successional riparian forests (Oconee NF)	No	Swainson's Warbler was selected as a MIS for early successional riparian habitats on the Oconee NF, primarily canebrakes. Habitat for this species is

			not present in the project area.
Red-cockaded woodpecker	To help indicate effects of management on recovery of this endangered species, and on mid-late successional pine forest community. (Oconee NF)	No	Red-cockaded woodpecker was selected as a MIS for open pine forests on the Oconee NF and do not occur on the Chattahoochee NF
Smooth Coneflower	To help indicate effects of management on recovery of this endangered species.	No	On the Chattahoochee NF, smooth coneflower is known only to occur on the Chattooga Ranger District in Habersham and Stephens Counties.
Black bear	To help indicate effects of management on supplying public demand for bear hunting and viewing.	Yes	Tree harvest and prescribed burning under some alternatives would affect the amount of hard and soft mast for this species, potentially affecting population levels.
White-tailed Deer	To help indicate effects of management on supplying public demand for deer hunting and viewing.	Yes	Tree harvest, prescribed burning and permanent opening management under some alternatives would affect the amount of browse and cover for this species, potentially affecting population levels.

MAJOR FOREST COMMUNITIES

Table 10 shows the existing forest type distribution for the Brawley Mountain Analysis Area.

Table 10. Summary of the Forest Type Distribution on the Brawley Mountain Analysis Area.

Forest Type	No. of Stands	Acres	Percent
03 (White Pine)	6	171	15.0%
10 (White Pine-Upland Hardwood)	1	17	1.5%
32 (Shortleaf Pine)	1	51	4.5%
53 (White Oak, Red Oak-Hickory)	13	617	54.3%
56 (Yellow Poplar, White Oak, Northern Red Oak)	7	281	24.7%
TOTALS		1137	100.0%

Element: Mesic Deciduous Forests

Measure: Measure will consist of species composition, successional stage, and forest structure in the effected timber stands and effects on habitat conditions and populations of associated species from project activities. **Bounds of Analysis – Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres

of the proposed action. There are 28 stands summing to approximately 1,137 acres.
Temporal: Approximately 10 years following implementation

Existing Conditions:

This forest community consists of cove hardwoods which may include yellow poplar, white oak, northern red oak, basswood and ash (Forest Type 56) and the more mesic portions of the upland hardwood stands (Forest Type 53). Cove hardwood forests exist in 7 stands with a total of 281 acres of the analysis area, primarily in the coves and north and east facing-slopes. This represents approximately 25% of the analysis area. Ages of these stands range from 37 to 102 years old, with nearly 90 percent in mid-late successional conditions. Basal area ranges from 60 to 100 or approximately 50 to 150 stems per acre. Understory development is limited in many of these stands, particularly the closed canopy, mid-successional stands. There are approximately 617 acres of upland hardwood stands in the analysis area but only a small portion of these stands are located on mesic sites (north aspect, riparian corridor). The majority are located on more xeric sites and are included the discussion of oak and oak-pine communities below.

The revised Forest Plan identified the hooded warbler as a MIS to help indicate the effects of management on species associated with mature mesic deciduous forests. Hooded warblers are found in mixed hardwood forests of beech, maple, hickory and oaks with a dense undergrowth (DeGraaf et al 1991). They nest in the understory of deciduous forests, and a dense shrub layer and scant ground cover are important (NatureServe 2007). Mature forests with a structurally diverse understory and midstory layers are favored. They typically inhabit mature forests containing canopy gaps (La Sorte et al 2007). The Hooded Warbler is a common breeding bird on the Blue Ridge Ranger District and has been reported from Breeding Bird Surveys in the Brawley Mountain project area. Given the availability of mature mesic deciduous forest habitat, population levels likely are moderate.

Effects of Alternative 1 (No-Action)

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to mature mesic deciduous forest habitat are expected. Existing habitat conditions for the hooded warbler and other species that utilize mature mesic deciduous habitats will be maintained. Through time, the amount of mature mesic deciduous habitat will increase as the portions containing young forests mature. This should result in improved habitat conditions for the hooded warbler and other species that utilize mature mesic deciduous habitats.

Cumulative Effects - Mature mesic hardwood forests are common on the Brawley Mountain Area and are abundant on the Forest as a whole. The revised Forest Plan has an objective to increase the structural diversity in mature mesic deciduous forests quantity and quality of these forests and populations of hooded warblers and associated species are expected to increase through the implementation of the Plan (USDA Forest

Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), there is strong evidence suggesting that hooded warblers have decreased on National Forests in the Southern Blue Ridge (La Sorte et al 2007). However this analysis indicates that hooded warbler populations have increased on the Chattahoochee-Oconee National Forest over this same time period.

There are no additional activities planned for the Brawley Mountain area that would affect the availability of mature mesic deciduous forests. Therefore no cumulative effects to mature mesic deciduous habitat and associated species such as hooded warblers are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects - In this alternative, canopy reduction through timber harvest would occur in approximately 230 acres of the 281 acres of mesic deciduous hardwoods in the analysis area. The mesic deciduous forests occur primarily in mid and lower slopes and coves and are located in areas that would receive moderate to low degree of canopy opening. On mid-slope sites, a range of 20-60 percent canopy cover would be maintained after the thinning treatment. Greater than 60 percent of the canopy cover would be retained in the lower slope positions. The trees to be retained will be the larger mast-producing oaks and hickories. Although some mature mast producing oaks will be cut on these sites in order to achieve the desired post-harvest stand conditions, the expansion of the crowns of the remaining trees will largely offset any reduction in oak mast production.

As a result of the canopy reduction, portions of these mid-slope sites will develop a relative dense understory, increasing its habitat suitability for hooded warblers and other shrub-nesting birds. On the lower slopes of the project area, the degree of canopy opening will be more limited but the canopy gaps created will also create favorable conditions for hooded warblers.

Following timber harvest, portions of these sites will be prescribed burned. The prescribed burn will be a low intensity backing fire with little impact on these moist sites. The burning will take place during the dormant season with only the dead ground litter being consumed.

If needed, a very selective herbicide treatment of stump sprouts also may be used to control competing vegetation in the upper slope portions of these stands to encourage the establishment of herbaceous vegetation. No herbicide application will occur within the lower slope or riparian areas. There will be no direct effects of the herbicide application on hooded warblers or other mesic forest bird species. Hazard quotients (summarized in Appendix B, project folder) for small birds consuming contaminated insects are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure.

Cumulative Effects - Mature mesic hardwood forests are common on the Brawley Mountain Area and are abundant on the Forest as a whole. The revised Forest Plan has an objective to increase the structural diversity in mature mesic deciduous forests quantity and quality of these forests and populations of hooded warblers and associated species are expected to increase through the implementation of the Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), there is strong evidence suggesting that hooded warblers have decreased on National Forests in the Southern Blue Ridge (La Sorte et al 2007). However this analysis indicates that hooded warbler populations have increased on the Chattahoochee-Oconee National Forest over this same time period.

This alternative will have a positive effect on mesic hardwood forest by creating canopy gaps that will enhance structural diversity. There are no additional activities planned for the Brawley Mountain area that would affect the availability of mature mesic deciduous forests. Therefore no cumulative effects to mature mesic deciduous habitat and associated species such as hooded warblers are expected.

Effects of Alternative 3

Direct and Indirect Effects – The effects of this alternative on mesic deciduous forests will be less than in Alternative 2. In this alternative, the woodland restoration would be confined to the upper-mid south and west-facing slopes and adjacent ridgelines. As a result, thinning activities will not take place in these more mesic stands. Similarly, no herbicide application would occur in these stands. These sites would be prescribed burned as part of a larger burning block. However, prescribed burn will be a low intensity backing fire with little impact on these moist sites. Existing habitat conditions for hooded warblers and associated species would be maintained in these stands although in mid-successional stands where canopy closure reduces understory development, habitat suitability for hooded warblers will remain limited.

Cumulative Effects - The cumulative effects of this alternative on mesic deciduous forests and habitat suitability hooded warblers and associated species would be similar to Alternative 2.

Effects of Alternative 4

Direct and Indirect Effects – The effects of this alternative on mesic deciduous forests would be similar to Alternative 2. In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. As in Alternative 2, the woodland restoration would be confined to the upper-mid south and west-facing slopes and adjacent ridgelines. As a result, thinning activities will not take place in these more mesic stands. These sites would be prescribed burned as part of a larger burning block. However, prescribed burn will be a low intensity backing fire with little impact on these moist sites. Existing habitat conditions for hooded warblers and associated species would be maintained in these stands although in mid-successional

stands where canopy closure reduces understory development, habitat suitability for hooded warblers will remain limited.

Cumulative Effects - The cumulative effects of this alternative on mesic deciduous forests and habitat suitability hooded warblers and associated species would be similar to Alternative 2.

Element: Eastern Hemlock and White Pine Forest

Measure: Measure will consist of species composition, successional stage, and forest structure in the effected timber stands and effects on habitat conditions and populations of associated species from project activities. **Bounds of Analysis** – **Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres.

Temporal: Approximately 10 years following implementation

Existing Conditions:

This forest community on the project area consists mainly of white pine plantations and stands with white pine as a major component (Forest Types 03 and 10). There are 188 acres of white pine forest types in the analysis area. Most these acres (128 acres) are in plantations with ages ranging from 26 to 44 years. The remaining 60 acres are in stands approximately 100 years old. Basal areas of these stands range from 80 to 140 or approximately 60 to 300 stems per acre. These plantations have a very dense canopy that limits the amount of sunlight to reaching the forest floor. As a result herbaceous growth is limited under these stands as is the natural regeneration of more desirable species such as oak or shortleaf pine. There are no hemlock stands in the project area.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects: This alternative will perpetuate current conditions and no direct impacts to white pine forest habitat are expected. Through time, the white pine plantations will continue to grow at a slow rate each year due their overstocked condition. There will be little if any chance for oak or shortleaf pine to become established in these areas. The older white pines will continue to produce seed and will expand into the surrounding hardwood stands.

Cumulative Effects – The acreage of white pine forests in the Southern Appalachians have increased substantially in the last 30 years, largely due to increases in pine plantations and upland encroachment of white pine in hardwood stands due to fire exclusion (USDA Forest Service 2004a). The revised Forest Plan has objectives to restore oak and oak-pine forest on sites currently occupied by pine plantations and to maintain oak and oak-pine stands through thinning and prescribed burning. The implementation of the plan likely will reduce these white pine communities to a more natural distribution on the landscape over time. No progress toward meeting plan

objectives related to the management of white pine communities will be made on the Brawley Mountain under the no-action alternative.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects - In this alternative, canopy reduction through timber harvest would occur in approximately 95 acres of the 188 acres of white pine forests in the analysis area. The white pine forests occur on the ridgetop and mid slopes and are located in areas that would receive moderate to high degree of canopy opening. On the ridgetop and upper slopes, 20 percent canopy cover would be maintained after the thinning treatment, while on mid-slope sites, a range of 20-60 percent canopy cover would be maintained. White pine, which is fire intolerant will be targeted for removal, substantially opening up these stands. The trees to be retained will fire-tolerant tree species such as blackjack oak, southern red oak, yellow pines as well as the larger mast-producing oaks and hickories. Following timber harvest, prescribed fire and selective herbicide applications will be used to promote the establishment of herbaceous species as well as fire tolerant species such as blackjack oak, post oak and shortleaf pine. The periodic prescribed burning also will reduce the encroachment of white pine into adjacent hardwood stands.

Cumulative Effects – The acreage of white pine forests in the Southern Appalachians have increased substantially in the last 30 years, largely due to increases in pine plantations and upland encroachment of white pine in hardwood stands due to fire exclusion (USDA Forest Service 2004a). The revised Forest Plan has objectives to restore oak and oak-pine forest on sites currently occupied by pine plantations and to maintain oak and oak-pine stands through thinning and prescribed burning. The implementation of the plan likely will reduce these white pine communities to a more natural distribution on the landscape over time. The thinning and burning in this alternative will assist in meeting plan objectives related to the management of white pine communities.

Effects of Alternative 3

Direct and Indirect Effects - The effects of this alternative will be similar to Alternative 2. In this alternative, the woodland restoration would be confined to the upper-mid south and west-facing slopes and adjacent ridgelines. The white pine forests occur on the ridgetop and mid slopes and are located in areas that would receive moderate to high intensity treatments. White pine will be targeted for removal, substantially opening up these stands. Following timber harvest, prescribed fire and selective herbicide applications will be used to promote the establishment of herbaceous species as well as fire tolerant species such as blackjack oak, post oak and shortleaf pine. The periodic prescribed burning also will reduce the encroachment of white pine into adjacent hardwood stands.

Cumulative Effects – The cumulative effects of this alternative on white pine forests will be similar to Alternative 2.

Effects of Alternative 4

Direct and Indirect Effects - The effects of this alternative on white pine forests would be similar to Alternative 2. In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Stand density in existing white pine stands will be reduced substantially through thinning and periodic prescribed burning will help promote the establishment of herbaceous species as well as fire tolerant species such as blackjack oak, post oak and shortleaf pine.

Cumulative Effects – The cumulative effects of this alternative on white pine forests will be similar to Alternative 2.

Element: Oak and Oak-Pine Forests

Measure: Measure will consist of species composition, successional stage, and forest structure in the effected timber stands and effects on habitat conditions and populations of associated species from project activities. **Bounds of Analysis** – **Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres.

Temporal: Approximately 10 years following implementation

Existing Conditions:

In the analysis area this forest community consists of upland hardwood forest of white oak, northern red oak, chestnut oak, scarlet oak, black oak and various hickories (Forest Type 53). There are approximately 617 acres of oak and oak- pine stands in the analysis area. This represents approximately 54% of the analysis area. Over 90 percent of these stands are in mid- to-late successional conditions and are capable of mast production. Approximately 60% of theses oak stands are in late successional conditions (greater than 80 years-of-age).

The revised Forest Plan identified the Scarlet Tanager as a MIS to help indicate the effects of management on species associated with mature upland oak communities. The scarlet tanager is most abundant in mature, upland deciduous forests (Hamel 1992). It is most common in areas with a relatively closed canopy, a dense understory with a high diversity of shrubs, and limited ground cover (NatureServe 2007). Over half of the Brawley Mountain area consists of mature upland hardwood forests. The scarlet tanager is a common breeding bird on the Blue Ridge Ranger District and has been reported from Breeding Bird Surveys in the Brawley Mountain project area. Given the availability of mature upland oak forest habitat, population levels likely are moderate.

Effects of Alternative 1 (No-Action)

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to oak and oak-pine forest habitat are expected. Existing habitat conditions for the scarlet tanager and other species that utilize mature oak habitats will be maintained. Through time, the amount of mature oak forest habitat will increase as the portions containing young forests mature. This should result in improved habitat conditions for the scarlet tanager and other species that utilize these habitats. However, with no-action, shade-tolerant white pine seedlings may become established in some of the mature oak stands, reducing the oak component in the future.

Cumulative Effects- Mature oak forests are abundant on the Brawley Mountain area and Forest as a whole. The availability of older oak stands and populations of scarlet tanagers and associated species are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), scarlet tanager populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). However this analysis indicates that scarlet tanager populations have increased on the Chattahoochee-Oconee National Forest over this same time period.

There are no additional activities planned for the Brawley Mountain that would affect the availability of mature oak forests. Therefore no cumulative effects to mature upland oak habitat and associated species such as scarlet tanagers are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects - In this alternative, canopy reduction through timber harvest would occur in approximately 380 acres of the 617 acres of oak and oak-pine forests in the analysis area. These oak forests occur primarily on the ridgetop and mid slopes and are located in areas that would receive moderate to high degree of canopy opening. Only about 60 acres of oak stands to be thinned are located on the lower slopes.

There will be some reduction in the availability of oak mast with the implementation of this alternative. As the post-sale high canopy cover on these ridge top sites would be approximately 20 percent, the quantity of mature mast producing trees on these ridgetop sites will decrease. However, because the trees to be retained on these sites will primarily be fire-tolerant species such as blackjack oak and southern red oak, some limited mast producing capability will be maintained. The degree of canopy removal will be more moderate on the mid and lower slope positions. On mid-slope sites, a range of 20-60 percent canopy cover would be maintained after the thinning treatment and greater than 60 percent of the canopy cover would be retained in the lower slope positions. White pine, poplar, red maple would be targeted for removal with the larger oaks and hickories favored for retention. Although some mature mast producing oaks will be cut and removed from these sites, the expansion of the crowns of the remaining trees will largely offset any reduction in oak mast production, especially on the lower slopes. Crown size has a strongly influence on oak mast production (Greenberg 2000). While oak mast

capability will decline in the analysis area, the availability of acorns for mast consuming species will remain high. Mature oak stands comprise over half of the analysis area and ridgetop and upper slope stands where the greatest reduction will occur represent only a fraction of the available acreage. In addition, there is a large oak component in the mesic deciduous stands that will further contribute to the mast capability of the area. Through time, mast capability will increase in the younger stands in the analysis area as they mature.

The effects of this alternative on the scarlet tanager and other species associated with oak and oak-pine forest will vary across the treatment area, depending on the degree of canopy reduction. The timber harvest treatments proposed for the ridgetop and upper slopes would result in a substantial opening of the overstory canopy. The subsequent prescribed burning and herbicide application proposed for these sites will result in a reduction in the woody understory and an increase in herbaceous cover. These open conditions on the ridgetops would decrease habitat suitability for the scarlet tanager and other songbirds that prefer well developed understory and shrub layers.

The more moderate degree of canopy opening on the mid and lower slopes should create favorable habitat conditions for scarlet tanagers and associated species. Portions of these mid-slope sites will develop a relative dense understory, increasing its habitat suitability. On the lower slopes of the project area, the degree of canopy opening will be more limited but the canopy gaps created will also create favorable conditions for scarlet tanagers.

If needed, a very selective herbicide treatment of stump sprouts also may be used to control competing vegetation in the upper slope portions of these stands to encourage the establishment of herbaceous vegetation. No herbicide application will occur within the lower slope or riparian areas. There will be no direct effects of the herbicide application on scarlet tanager or other associated bird species. Hazard quotients (summarized in Appendix B, project folder) for small birds consuming contaminated insects are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure.

Although habitat suitability for scarlet tanagers will be decreased on the ridgetop portions of the Brawley Mountain project area, it will be enhanced on the mid and lower slopes and the availability of suitable habitat will remain abundant in the analysis area. Through time, the amount of mature oak forest habitat will increase as forests in the analysis area mature. This should result in improved habitat conditions for the scarlet tanagers and other species that utilize mature oak and oak-pine forest habitats.

Cumulative Effects- There will be some reduction in the availability of oak mast with the implementation of this alternative. However the ridgetop and upper slope stands, where the greatest reduction, will occur represent only a fraction of the available acreage. Mature mast producing stands are abundant on the Brawley Mountain area and Forest as a whole. Mast producing stands (>40 years-old) comprise nearly three-fourths (800 acres) of the analysis area and over half (4700 acres) of 6th-level watershed where the

project will occur. There are nearly 200,000 acres of mast producing stands on the Blue Ridge Ranger District (64% of the forested acres) and over 400,000 acres on the Chattahoochee National Forest (56% of forested acres). Projects such as this may reduce mast-capability in a very localized area but the availability of mast will remain abundant on the Forest. Acorn availability is expected to increase with the implementation the revised Forest Plan (USDA Forest Service 2004a).

Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), scarlet tanager populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). However this analysis indicates that scarlet tanager populations have increased on the Chattahoochee-Oconee National Forest over this same time period. The availability of older oak stands and populations of scarlet tanagers and associated species are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a).

There are no additional activities planned for the Brawley Mountain that would affect the availability of mature oak forests. Therefore no cumulative effects to mature upland oak habitat and associated species such as scarlet tanagers are expected.

Effects of Alternative 3

Direct and Indirect Effects – The direct effects of this alternative would be similar to Alternative 2. In this alternative, canopy reduction through timber harvest would occur in approximately 260 acres of the 617 acres of oak and oak-pine forests in the analysis area. As compared to Alternative 2, timber harvest would occur comparable acreage of ridge top sites in this alternative, but the acres thinned on the mid slope sites will be reduced. As in Alternative 2, oak mast production will decline on the ridgetop sites due to the degree of canopy reduction. Similarly, habitat suitability for scarlet tanager and other species associated with mature oak forests will decline on the ridgetops and upper slopes. On the mid-slope sites, some mature mast producing oaks will be cut and removed but the expansion of the crowns of the remaining trees will largely offset any reduction in oak mast production. Portions of these mid-slope sites will develop a relative dense understory, increasing its habitat suitability for scarlet tanager and associated species. No timber harvest treatments will occur on the lower slopes under this alternative.

Although habitat suitability for scarlet tanagers will be decreased on the ridgetop portions of the Brawley Mountain project area, it will be enhanced on the mid and lower slopes and the availability of suitable will remain abundance in the analysis area. Through time, the amount of mature oak forest habitat will increase as forests in the analysis area mature. This should result in improved habitat conditions for the scarlet tanagers and other species that utilize mature oak and oak-pine forest habitats.

Cumulative Effects - The cumulative effects of this alternative on oak and oak-pine forests and habitat suitability scarlet tanager and associated species would be similar to Alternative 2. There are no additional activities planned for the Brawley Mountain that

would affect the availability of mature oak forests. Therefore no cumulative effects to mature upland oak habitat and associated species such as scarlet tanagers are expected.

Effects of Alternative 4

Direct and Indirect Effects – The direct of this alternative would be similar to Alternatives 2 and 3. The acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. As in Alternative 3, oak mast production will decline on the ridgetop sites due to the degree of canopy reduction. Similarly, habitat suitability for scarlet tanager and other species associated with mature oak forests will decline on the ridgetops and upper slopes. On the mid-slope sites, some mature mast producing oaks will be cut and removed but the expansion of the crowns of the remaining trees will largely offset any reduction in oak mast production. Portions of these mid-slope sites will develop a relative dense understory, increasing its habitat suitability for scarlet tanager and associated species. No timber harvest treatments will occur on the lower slopes under this alternative.

Cumulative Effects - The cumulative effects of this alternative on oak and oak-pine forests and habitat suitability scarlet tanager and associated species would be similar to Alternative 2. There are no additional activities planned for the Brawley Mountain that would affect the availability of mature oak forests. Therefore no cumulative effects to mature upland oak habitat and associated species such as scarlet tanagers are expected.

Element: Pine and Pine-Oak Forests

Measure: Measure will consist of species composition, successional stage, and forest structure in the effected timber stands and effects on habitat conditions and populations of associated species from project activities. **Bounds of Analysis – Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation

Existing Conditions:

This forest community consists of yellow pine stands where 70% or greater of the dominant trees are yellow pine or pine-oak stands where yellow pine makes up 51% to 69% of the dominant trees. There is one shortleaf pine stand (Forest Type 32) the analysis area. This 51 acre stand is 37 years old.

The revised Forest Plan identified the pine warbler as a MIS to help indicate the effects of management on species associated with yellow pine and pine-oak forests. The pine warbler uses mid to late successional pine forests throughout the year (Hamel 1992). It occurs in both open pine woodlands and dense pine plantations, but seldom uses hardwood stands. The highest numbers seem to occur where pure stands of pine are found. It is less abundant as the proportion of hardwood tree species increases

(NatureServe 2007). The pine warbler is a common breeding bird on the Blue Ridge Ranger District. It has not been reported from Breeding Bird Surveys in the Brawley Mountain project area. Mid to late successional pine and pine-oak forest habitat are very limited on the project area and therefore, population levels of pine warblers likely are low.

Effects of Alternative 1 (No-Action)

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to pine and pine-oak forest habitat are expected. Existing habitat conditions for the pine warblers and other species that utilize mature pine will be maintained. Through time, the existing young pine stand will mature, providing additional habitat for pine warblers and species that utilize mature pine forests. However, with no-action, lack of prescribed burning may limit shortleaf pine regeneration. In addition, future attacks from southern pine beetle and encroachment from white pines and hardwoods will result in a reduced pine component in the future.

Cumulative Effects - Shortleaf pine stands will decline in the surrounding area because of the increase in urbanization and a lack of prescribed burning on private lands. Private ownership in the surrounding area is made up of individually owned small blocks that cannot be feasibly burned. Residential development in the urban interface will continue to remove portions of remaining shortleaf pine in the area. Southern Pine Beetle mortality on private lands has also reduced the shortleaf component in adjacent areas. Mature pine forests are somewhat limited on the Brawley Mountain area but are abundant on the Forest as a whole. The availability of older pine stands on the Forest has increased over the last few decades. However, recent outbreaks of Southern Pine beetle have reduced the availability of these habitats on some portions of the Forest.

The availability of older pine stands and populations of pine warblers and associated species are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), pine warbler populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that pine warbler populations also have been stable on the Chattahoochee-Oconee National Forest over this same time period.

There are no additional activities planned for the Brawley Mountain area that would affect the availability of mature pine forests. Therefore no cumulative effects to pine and pine-oak forest habitat and associated species such as pine warblers are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects - In this alternative, canopy reduction through timber harvest would occur in approximately 20 acres of the 51 acres of pine and pine-oak forests in the analysis area. The existing shortleaf pine stand occurs on the lower portion of the central ridge. Only the portion north of the Weeks Creek road would be treated

and would receive moderate to high degree of canopy opening. The larger shortleaf pines and other fire-tolerant tree species such as oaks and hickories will be retained, while fire intolerant species such as white pine and yellow poplar will be targeted for removal. This will result in a substantial opening of the canopy in this stand. Following timber harvest, prescribed fire and selective herbicide applications will be used to promote the establishment of herbaceous species as well as shortleaf pine and oak seedlings. The thinning also will increase vigor in the remaining trees and increase their resistance to southern pine beetle attack. These activities also will result in improved habitat conditions for the pine warbler and species that utilize mature pine forests. However, because of the limited quantity of pine habitat in the analysis area, pine warblers will continue to be uncommon.

There will be no direct effects of the herbicide application on pine warblers or other songbirds that utilize mature pine forests. Hazard quotients (summarized in Appendix B, project folder) for small birds consuming contaminated insects are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure.

Cumulative Effects - Shortleaf pine stands will decline in the surrounding area because of the increase in urbanization and a lack of prescribed burning on private lands. Private ownership in the surrounding area is made up of individually owned small blocks that cannot be feasibly burned. Residential development in the urban interface will continue to remove portions of remaining shortleaf pine in the area. Southern Pine Beetle mortality on private lands has also reduced the shortleaf component in adjacent areas. Mature pine forests are somewhat limited on the Brawley Mountain area but are abundant on the Forest as a whole. The availability of older pine stands on the Forest has increased over the last few decades. However, recent outbreaks of Southern Pine beetle have reduced the availability of these habitats on some portions of the Forest.

The availability of older pine stands and populations of pine warblers and associated species are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), pine warbler populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that pine warbler populations also have been stable on the Chattahoochee-Oconee National Forest over this same time period.

There are no additional activities planned for the Brawley Mountain area that would affect the availability of mature pine forests. Therefore no cumulative effects to pine and pine-oak forest habitat and associated species such as pine warblers are expected.

Effects of Alternative 3

Direct and Indirect Effects – The direct effects of this alternative would be similar to Alternative 2. The thinning, prescribed fire and selective herbicide applications will promote the establishment shortleaf pine and oak seedlings as well as herbaceous species.

The thinning also will increase vigor in the remaining trees and increase their resistance to southern pine beetle attack. These activities also will result in improved habitat conditions for the pine warbler and species that utilize mature pine forests. However, because of the limited quantity of pine habitat in the analysis area, pine warblers will continue to be uncommon.

Cumulative Effects - The cumulative effects of this alternative on pine and pine-oak forests and habitat suitability pine warblers and associated species would be similar to Alternative 2. There are no additional activities planned for the Brawley Mountain that would affect the availability of mature pine forests. Therefore no cumulative effects to mature pine habitat and associated species such as pine warblers are expected.

Effects of Alternative 4

Direct and Indirect Effects - The effects of this alternative on yellow pine forests would be similar to Alternative 2. In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. The thinning, prescribed fire and selective herbicide applications will promote the establishment shortleaf pine and oak seedlings as well as herbaceous species. The thinning also will increase vigor in the remaining trees and increase their resistance to southern pine beetle attack. These activities also will result in improved habitat conditions for the pine warbler and species that utilize mature pine forests. However, because of the limited quantity of pine habitat in the analysis area, pine warblers will continue to be uncommon.

Cumulative Effects - The cumulative effects of this alternative on pine and pine-oak forests and habitat suitability pine warblers and associated species would be similar to Alternative 2. There are no additional activities planned for the Brawley Mountain that would affect the availability of mature pine forests. Therefore no cumulative effects to mature pine habitat and associated species such as pine warblers are expected.

SUCCESSIONAL STAGE HABITATS

Element – Successional Forests and Mixed Woodlands, Savannas, and Grasslands

Measure(s) :

The measure of effects for this topic is the acres of habitats by each one of four successional classes; (1) early, (2) sapling/pole, (3) mid, and (4) late within the stands with some or all of their area affected by the proposed action. These successional classes are as defined for the plan revision environmental impact statement (Forest Service, 2004). For this particular project, the age ranges are the same for each of the forest community types that are affected. These age ranges are shown in the table below.

Table 11. Forest Age Range in Years Associated with Forest Successional Classes

Early-Successional	Sapling/pole	Mid-successional	Late Successional
0 through 10	11 through 40	40 through 80	More than 80

Note: For clarity the discussion of woodland, savannas, and grasslands are included in this section. See the 'Old Growth' topic of this document for a detailed analysis of old growth as a separate successional class.

Bounds of Analysis:

Spatial- The spatial bound of the analysis area is all of the stands that are wholly or partially within the treatment acres of the proposed action. There are 28 stands summing to 1,137 acres. These 1,137 acres will be referred to as the 'analysis area' for this topic. Other authors in other topics may use the same term to refer to a different geographic area, depending upon the bounds they needed for their analysis. However, an effort has been made to use the same bounds where appropriate. Minor difference may exist because of how the GIS analysis was done.

Temporal – The time bound of the analysis is the range of ages in the existing stands of the analysis area for past effects and 2007 through 2017 for current and future effects. The base year used for calculating successional class is 2007.

Existing Conditions:

Each successional class has different vegetation attributes. Each combination of attributes within each successional class is of value as wildlife habitat. Greatest value as habitat at landscape scale of thousands to tens of thousands of acres occurs with a diverse mix of the various successional classes creating variety in vegetation species and vegetation structure. Successional class diversity is created and maintained by the frequency, intensity, pattern and combinations of disturbance events. Disturbance events can be either natural, human-caused or a combination of both such as the Hurricane Opal blow down and salvage.

A summary and comparison of key characteristics for each forest successional class is shown in the table below.

Table 12. Comparison of Key Vegetation Characteristics of Forest Successional Classes.

Attribute	Early-successional	Sapling/pole	Mid-successional	Late Successional
Canopy closure	none	Tightly closed	Closed	Closed to somewhat open
Overstory stem density	Low or absent	Extremely dense	Dense	Moderately dense to open
Grass-forb component	significant	absent	Sparse to absent	Sparse to absent

Stem diameters	Very small	Small	Moderate	Large
Tree cavities	Very low or none	None	Few	Moderate to high
Canopy stratification	None	None	Begins to develop	Well-developed

The table below summarizes the amount of each successional class that exists as of 2007 within affected stands.

Table 13. Amount of Each Forest Successional Class at the Scale of the Brawley Mountain Project Analysis Area. Base year 2007.

Forest Successional Class	# of stands	Acres	Percent
Early-successional	0	0	0
Sapling/pole	9	225	20.4
Mid-successional	6	346	28.2
Late successional	13	566	51.4
Total	28	1,137	100

As can be seen, the prevailing condition within the affected stands is primarily one of closed high canopy with a more or less well-developed vertical stratification of shade tolerant and fire intolerant understory. Herbaceous ground cover is typically sparse or absent, being suppressed by dense shade, accumulated decomposing leaves and annual leaf fall. Trees are old enough to have well-developed cavities from wounds but fire, the primary historic wounding agent, has been effectively suppressed for the lifetime of the trees growing on about 70-percent of the area; that is, for about 80 years. Largest cavities are created by wounding of the main bole, especially basal wounding at the point where each stem is largest. Fire was the most common historic agent of basal wounding. Today lightening would be the most common bole wounding agent. Limb and upper trunk wounds are more likely to be created by ice, wind storms, rotten branch stubs or by wounds created by the falling of nearby living trees or snags.

Forest Inventory and Analysis (FIA) data was queried for the estimated number of stems one-inch in diameter and larger at 4.5 feet above the ground by species and crown class within just the oak forest types for Chattahoochee National Forest ‘timberland’ and also within the Southern Blue Ridge ecological subsection. (Note, no attempt was made to further refine by using age as a criteria because the effect was expected to be insignificant to the result.) ‘Timberland’ is productive forest land not withdrawn from timber harvest by legislation. The Southern Blue Ridge ecological subsection is the mountainous part of Georgia east of the Appalachian Highway corridor. The total estimated population of trees by species was then divided by the acres of National Forest timberland to produce an estimated number per acre. The purpose of this analysis is two-fold: (1) to indicate the vertical stratification of mid and late successional stands, and (2) to indicate the amount and type of woody competition to herbaceous species establishment.

Table 14. Average Number per Acre of Intermediate and Overtopped Crown Class Non-oak Species within Oak Forest Types on Timberland in the Southern Blue Ridge Ecological Subsection of the Chattahoochee National Forest.

Species	Avg. # of Stems/Acre
Red maple	96
Sourwood	53
Yellow poplar	47
Blackgum	33
Hickory sp.	31
Flowering dogwood	26
Birch sp.	24
Eastern white pine	10
Black locust	6
Total	326

Source:

Miles, Patrick D. Sep-18-2006. Forest inventory mapmaker web-application version 2.1. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. [Available only on internet: www.ncrs2.fs.fed.us/4801/fiadb/index.htm]

The Brawley Mountain road and power line provides a transect through some of the ecological conditions of elevation, aspect, soil type, and treatment regime within the affected stands. The initial exposed soil of the road bank approximates the open, sunny and light litter conditions that will occur on the ridges and upper slopes of the woodland following burning and especially on the skid trails in these locations. The power line right-of-way approximates the effects of burning without soil disturbance or herbicide treatment because of the periodic hand or mechanical brush cutting. The response of native species to these conditions provides a local forecast of results to be expected. Native grass species observed along the road and power line include; purpletop grass (*Tridens flavus*), bluestem grass (*Andropogon* sp.), and panic grasses, (*Panicum* sp). Each of these grasses is a bunch grass and do not form a sod by sending out rhizomes; therefore they leave habitat niches of light litter cover or bare soil interspersed among them that can be colonized by other native species.

The revised Forest Plan identified the prairie warbler as a MIS to help indicate the effects of management on species associated with early successional forests and the field sparrow as a MIS to help indicate the effects of management on species associated with woodland, savanna, and grassland communities. Because the mid and late successional forest habitats support more divergent communities depending on their composition, management indicator species for these habitats are identified and analyzed under the individual major forest community sections above.

Prairie warblers are shrubland nesting birds found in suitable habitats throughout the Southern Appalachians, Piedmont, and Coastal Plain (Hamel 1992). Prairie warblers require a dense forest regeneration or open shrubby conditions in a forest setting. Near optimal habitat conditions are characterized by regeneration, thinned areas or patchy openings 10 acres or more in size (Nature Serve 2007). Populations respond favorably to

conditions created 3 to 10 years following regeneration in larger forest patches (Lancia et al. 2000). Prairie warblers occur through the Forest. The prairie warbler is a common breeding bird on the Blue Ridge Ranger District but has not been reported from Breeding Bird Surveys in the Brawley Mountain project area likely due to the limited availability of early successional habitats.

Field sparrows are associated with scattered saplings or shrubs in tall weedy or herbaceous cover (Hamel 1992). Field sparrows are relatively uncommon on the Blue Ridge Ranger District and have not been reported from Breeding Bird Surveys in the Brawley Mountain project area likely due to the lack of woodland, grassland, and savanna habitat, population levels likely are very low.

The golden-winged warbler also is associated with woodland and high-elevation early successional forest habitats. Because it is the focus of this project, the effects of the various alternatives on golden-winged warblers are disclosed in a separate section below.

Effects of Alternative 1 (No Action)

Direct Effects - Within 10 years an additional 138 acres – or 61-percent of the current total - will age from the sapling-pole class to the mid-successional category. This is about 12-percent of the analysis area. And an additional 84 acres – or 27-percent of the current total – will age from the mid-successional class to the late-successional one. This is about 8-percent of the analysis area. With no action, habitat for prairie warbler, field sparrows and other species associated with early successional habitat and woodland conditions will remain limited.

Indirect Effects - Age and stress-related mortality is likely to increase, especially for scarlet and black oaks which become physiologically mature earlier than other longer-lived oaks such as white oak. Also oak decline, a disease complex, is widespread on the Chattahoochee and affects the red oak group more than the white oak. Canopy stratification due to understory development will also increase in the stands aging from sapling/pole class to mid-successional though the change will occur so gradually as to not be readily apparent, especially within the next ten years.

Cumulative Effects - Barring intense natural disturbance, the cumulative effects of no-action will be a steady shift toward mid and late successional forest conditions. Woody vegetation structural diversity will trend toward more similar conditions throughout the analysis area. Single tree and small group mortality will, however, gradually increase with increasing age but – as discussed in the “Old Growth” topic in this document – no stands will reach even minimum old growth age for about thirty years. At and beyond old growth age canopy ‘gappiness’ would become a vegetation structural attribute as single trees or small groups of trees die, blow over or get knocked over by others falling into them. These gaps do not provide effective early-successional habitat, including early-successional forest. Habitat for prairie warbler, field sparrows and other species associated with early successional habitat and woodland conditions will remain limited.

Effects of Action Alternatives

The effects analyzed for this topic are very similar to those of the ‘High Elevation Early Successional Habitats’ topic of this document. The primary differences are that; (1) the ‘High Elevation Early Successional Habitats’ topic emphasizes habitat distribution by elevation, and (2) it focuses on seven types of early-successional habitat. This analysis will concentrate on the effects to successional stage of forest habitat only.

Direct Effects - Following harvest, sunlight reaching the forest floor in the growing season will be greatly increased, or – conversely – shade will be greatly reduced. In the pre-treatment closed forest sunlight to the ground is primarily ‘sun flecks’; small patches of light that move with changing sun angle. Ridges and upper slopes will have about 80-percent sunlight, or 20-percent shade. Adjacent mid-slopes will have a range of 40 to 80-percent sunlight or 20 to 60-percent shade. Remaining areas – if applicable – will have more than 60-percent shade or less than 40-percent sun. Prescribed burning will reduce the leaf layer on the forest floor and the post-treatment annual leaf fall will be proportionate to the amount of residual canopy. In sunlit areas the leaf litter layer will be warmed along with exposed mineral soil. Many seeds stored in the ‘seed bank’ on the forest floor will germinate in response to the increased light and temperature, including bluestem grass and yellow poplar.

Following a harvest, felling and burning series or a harvest, felling, burning, selective herbicide treatment; the average diameter within treated areas will be significantly increased from current conditions because of the purposeful retention of the largest and most fire-resistant trees. Canopy stratification (vertical structure) will greatly decrease as intermediate and suppressed crown class trees are harvested, sub-merchantable understory stems are felled or top-killed by burning and saplings of shade tolerant species are also top-killed by burning.

Each action alternative will create what is being called here ‘transitional early-successional *forest* habitat’. It is transitional in that efforts are directed to creating a woodland condition with a predominantly herbaceous ground cover. But immediately after timber removal and for a few years thereafter woody species sprouts and seedlings will be the predominant ground vegetation. In the table for each alternative, this situation is identified in the “**2008-2010**” column. This condition will gradually change with either felling and burning or felling, burning and selective herbicide application such that herbaceous species and low-growing shrubs will be more and more dominant on the ground with a sparse to moderate high canopy cover of large trees as the woodland condition is fully achieved. In the table for each alternative, this situation is identified in the “**After 2010**” column. Woodland will then continue to be a form of early-successional habitat, but it will not be early-successional *forest* habitat.

Note that in the table for each alternative that ‘medium’ intensity treatment; that is areas with a target canopy cover of 21 to 60-percent are split fifty-fifty in the 2008-2010 time period with half of the acres of mid or late-successional forest then being considered

‘transitional early successional forest’ and half remaining as originally, either ‘mid; or ‘late-successional’ until woodland condition are achieved. At that time, all medium and high intensity treatments areas; that is, all area with canopy cover less than or equal to 60-percent are in the ‘woodland’ class which counts in its entirety as a form of early-successional habitat. This is because above about 40-percent canopy cover early successional habitat is not created but rather there is a sparse, moderately dense or dense mid or late-successional forest. Felling, burning and herbicide treatment gradually shift this area into being a component of the larger context woodland area. An alternative way to view this is that by its very nature fire-maintained woodland will have transitional habitat conditions around its periphery due to changes in fire intensity. This transitional area has different habitat value than either adjacent closed forest or adjacent more open forest and therefore contributes to the overall rich diversity.

The proposed timber harvest will enhance conditions for prairie warblers and other species associated with early successional forest habitats. The canopy opening on the ridgetops/upper slopes and mid-slope areas will result in the development of a dense shrub cover that will provide abundant nesting habitat. The subsequent prescribed burning, chainsaw felling and selective herbicide treatment will reduce the shrub cover to some degree. The intensity of these treatments will be less on mid-slope sites and these areas will retain significant shrub cover. However, on the ridgetops and upper slopes, these treatments will lead to a more herbaceous dominated condition, characteristic of woodland habitat. These conditions will favor species such as field sparrows that are associated with open, grassy areas. Although the area will be managed to maintain woodland conditions, portions of the area will continue to provide suitable habitat for species like prairie warblers that are more typically associated with early successional forests.

Indirect Effects - Residual trees will respond to the better growing conditions of space, light, water availability, soil volume availability and improved nutrient status with crown expansion. This effect will be offset by crown pruning from heat released during burns in the early years until the fuel loading has been reduced and trees have adjusted physiologically to the new conditions. Expanded crowns will – provided that the tree is a mast producer – result in increased hard mast yield on an individual tree basis but a decrease overall simply because of fewer mast-producing trees.

Burning will basally wound some of the residual trees and create entry points for wood-rotting fungi. Burning can also be expected to top-kill some of the trees chosen to be retained. The resulting standing snags will provide foraging habitat for insectivorous birds, especially woodpeckers, and relatively soft wood that can be excavated for nesting cavities. As these snags break up (typically from the top down) they will provide either large down woody or localized areas of higher fuel loading, higher fire intensity and longer dwell time as these larger fuels burn. Exposed soil along with the fertilizing effect of ash accumulation and the lethality of the high temperatures to pre-existent seeds or vegetation will create micro-habitat niches for colonization by other native species.

As the woody species stem density of sprouts and seedlings are reduced crown stratification will gradually break up and no longer show a 'layered' appearance. At fully restored woodland conditions there will be an open canopy of irregularly-distributed large trees above a ground cover of 1 to 6 feet tall grasses and fire-adapted shrubs or fire-resistant stump sprouts or seedlings

Cumulative Effects - There are no other currently planned, proposed or under consideration projects within the project area. Within the time frame being considered; that is, until 2017, the analysis area is at least a low priority candidate – if not a very low priority – for additional planned vegetation management. Future actions will be, during the life of the current plan, directed at first creating and then maintaining the woodland condition. Salvage operations could occur if another climatic event killed enough trees to be economically viable; however, the probability of such an occurrence on a one thousand acre area within a ten year period is very small. This is demonstrated by the existing age class structure within the analysis area with only the 20-acre Opal salvage area having occurred within the last several decades. Environmental analysis at the time would consider 'no action'; that is, no salvage, as one option.

Early successional habitats are extremely limited on the Brawley Mountain area. This habitat is somewhat more common on the Forest as a whole but has declined recently due to a reduction in forest management activities. The availability of early successional habitat and populations of associated species such as prairie warblers are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), prairie warbler populations have decreased on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that pine warbler populations have been stable on the Chattahoochee-Oconee National Forest over this same time period. There are no additional activities planned for the Brawley Mountain that would affect the availability of early successional forests. Therefore no cumulative effects to early successional forest habitat and associated species such as prairie warblers are expected.

Woodland, grassland, and savanna habitat is extremely limited on the Brawley Mountain Area and the Forest as a whole. Across the Forest, the availability of these habitats and populations of associated species such as field sparrow are expected to increase with the implementation of the revised Forest Plan (USDA Forest Service 2004a). The revised plan has an objective of restoring 10,000 acres of open woodlands, savannas, and grasslands on the Chattahoochee within the first 10 years of plan implementation (Objective 3.4). This would result in enhanced habitat conditions for field sparrows and other species associated with woodland, savanna, and grassland habitats. Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), field sparrow populations have been relatively stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that field sparrow populations have been also stable on the Chattahoochee-Oconee National Forest over this same time period. There are no additional activities planned for the Brawley Mountain that would

affect the availability of these habitats. Therefore no cumulative effects to woodland, grassland, or savanna habitats and associated species such as field sparrows are expected.

Effects of Alternative 2 (Proposed Action)

Direct Effects - Alternative 2 creates approximately 600 acres of woodland condition or about 53-percent of the entire analysis area. The contribution of each of the other existing successional classes to woodland is nearly equal at approximately 50-percent each. As a result, while the acreage in these successional classes changes substantially; their relative proportion on the landscape within the analysis area stays nearly constant. No existing successional class is eliminated and one habitat type is added. Mid and upper slope positions of the entire project area would be in woodland except for areas left for mitigation of visual quality effects or PETS species mitigation.

Because it includes the greatest number of treatment acres, this alternative would provide the greatest benefit to species associated with woodland conditions such as field sparrows. Similarly, this alternative will provide the greatest quantity of suitable habitat for species that are associated with early successional forests such as prairie warblers.

Table 15. Alternative 2 – Change in Successional Class

Successional Class	In 2007	2008-2010	After 2010	Acre Change	Percent change
Woodland	0	0	~590	+590	+590
Transitional early-successional forest	0	354	0	n/a	n/a
Sapling/pole	225	171	115	-110	-49
Mid-successional	346	254	189	-157	-45
Late Successional	566	358	243	-323	-57
Total	1,137	1,137	1,137	0	

Indirect Effects - Indirect effects will be as already described as being common to the action alternatives but will occur over the largest area of any action alternative.

Cumulative Effects - Cumulative effects will be as already described as being common to the action alternatives

Effects of Alternative 3

Direct Effects - Alternative 3 creates about 375 acres of woodland condition or about 33-percent of the entire analysis area. Each of the existing successional classes contributes between 27 and 43-percent of their pre-treatment acreages to woodland. No existing successional class is eliminated and one habitat type is added. In comparison with Alternative 2, one of the current ridgetop forests is unaffected.

As compared to Alternative 2, this alternative will create substantially less woodland habitat and the benefits to field sparrows and other species associated with these habitats will be less. Similarly, the benefits of this alternative to early successional species such as prairie warbler will be less than in Alternative 2 due to the reduction in acres of timber harvest, especially in the mid-slope areas.

Table 16. Alternative 3 – Acres by Successional Classes before and After Treatment.

Successional Class	In 2007	2008-2010	After 2010	Acre Change	Percent change
Woodland	0	0	~375	+375	+375
Transitional early-successional forest	0	249	0	n/a	n/a
Sapling/pole	225	177	~ 128	-97	-43
Mid-successional	346	285	~ 253	-93	-27
Late Successional	566	427	~ 381	-185	-33
Total	1,137	1,137	1,137	0	

Indirect Effects - Indirect effects will be as already described as being common to the action alternatives but occurring on about one-half the area of Alternative 2 and the same area as Alternative 4.

Cumulative Effects - Cumulative effects will be as already described as being common to the action alternatives.

Effects of Alternative 4

Direct Effects - The only difference in activities and their locations between Alternative 3 and Alternative 4 is that Alternative 3 includes the selective use of herbicide to eliminate stump sprouts from established rootstocks. Otherwise the same acres are treated by the same methods with the same effects.

Although the acres of woodland habitat created in this alternative are similar to Alternative 3, without the use of herbicides to control woody sprouts, the degree of herbaceous species development likely will be less. Even with repeated burning, a more shrub-dominated condition is expected. This will reduce the habitat suitability for field sparrows and other species associated with open grassy woodland conditions. However, the increased shrub cover will benefit prairie warblers and other species associated with early successional forest conditions.

Table 17. Alternative 4 - Acres by Successional Classes before and After Treatment.

Successional Class	In 2007	2008-2010	After 2010	Acre Change	Percent change
Woodland	0	0	~375	+375	+375
Transitional early-successional forest	0	249	0	n/a	n/a

Sapling/pole	225	177	~ 128	-97	-43
Mid-successional	346	285	~ 253	-93	-27
Late Successional	566	427	~ 381	-185	-33
Total	1,137	1,137	1,137	0	

Indirect Effects - Indirect effects will be as already described as being common to the action alternatives.

Cumulative Effects - Cumulative effects will be as already described as being common to the action alternatives.

Element – High Elevation ESH

Measure(s):

The measure of the effect is the acres of existing and proposed early-successional habitats by elevation within the 730-acre project area.

Bounds of Analysis:

Spatial- The spatial bound of the analysis area is the 730-acre project area.

Temporal – The time bound of the analysis is ten years prior to the current year through ten years following; that is 1997 through 2007 for existing early-successional and 2007 through 2017 for the proposed actions of the various alternatives.

Existing Conditions:

The forest plan EIS identifies that high elevation early-successional habitat includes seven different types: (1) early-successional forest; (2) restored woodlands and grasslands; (3) old fields; (4) balds; (5) open bogs; (6) glades; and (7) maintained openings such as power line or pipeline rights-of-way or wildlife openings above 3000 feet in elevation (Forest Service, 2004a). The first listed, early-successional *forest*, differs from the other types of early successional habitat in being a community of woody species regenerating following a relatively intense disturbance, usually very dense, while the others are grass, herbs, or a shrub-grass-herb combination community. As a practical average, early-successional forest is considered for planning and analysis purposes as any regenerating forest of less than ten years old. The age of ten is used because within a range of about eight to twelve years old the crowns of saplings meet at ‘crown closure’. After this happens, grasses such as bluestem, broad-leafed herbs such as pokeberry, and pioneering shrubs such as sumac very rapidly decline and the vegetation structure and vegetation composition changes dramatically. Suitability as wildlife habitat also changes with the vegetation changes.

Of the seven specified early-successional habitats, only early-successional forest and the narrow local distribution power line right-of-way alongside the road leading to Brawley Mountain are appropriate to be considered in the project area. The others do not occur.

The full range of elevation within the proposed project is approximately 2200 feet to 3080 feet in elevation above mean sea level or 880 feet of vertical relief. However, the acreage being treated is not uniformly distributed by elevation.

Existing non-forest early successional consists of; (1) the 2.4 miles of road bank and road shoulder, (2) the associated power line right-of-way, and (3) two small widened areas along the road, one of which was the salvage operation log landing in the gap just east of the crest of Brawley Mountain. The total estimated area of these three considered together – excluding the road running surface – is between 7 and 9 acres using an average estimated width of thirty feet. This amount is very narrow and intermittent as the road and power line alignment changes with terrain.

The approximately 20 acres of Hurricane Opal salvage to the northeast of the Brawley Mountain tower site is the only location within the proposed project that could be considered for meeting early-successional forest habitat. However, not all of the salvaged area would ever have been quality early-successional forest habitat because the periphery of wind throw disturbance is typically of ‘trees within stands’. At densities above about 30 square feet of post-disturbance basal area per acre the shading of residual crowns begins to affect the germination, survival and growth of very shade intolerant species such as native grasses and forbs. Above about 40 square feet of residual basal area the structure becomes one of an open canopy old forest. Pre-existent shade tolerant species such as dogwood, silverbell, black gum, red maple or white pine are favored and the pre-disturbance forest is not typically replaced in these low to moderate disturbance events.

Stand mapping for this project identified that the post-salvage logging effective early-successional area was twelve acres. However, the hurricane occurred twelve years ago so re-growth is now more than ten years old and no longer qualifies as effective early-successional forest habitat. The associated road and power line right-of-way has created a sliver of sapling-grass-forb habitat of variable width but nowhere as much as fifty feet wide and typically considerably smaller.

The chestnut-sided warbler was selected as a MIS to help indicate the effects of management on species associated with high-elevation early successional forests. Chestnut-sided warblers are found in second-growth forests, overgrown fields, woodland edges, and in open, park-like woods (Hamel 1992). They are most common in suitable habitat over 3500 feet elevation, but occur sparingly down to 2000 feet and below. They are associated with dense vegetation in the form of shrubs and small trees about 3 feet above the ground that provides nesting sites and foraging areas (DeGraaf et al. 1991). Chestnut-sided warblers can be found in early successional forest habitats at higher elevations throughout the Forest. However, these types of habitat are limited on the Forest and have decreased due to a reduction in active forest management. There are no stands less than 10 years of age in the Brawley Mountain project area. A small number

of chestnut-sided warblers have been reported from Breeding Bird Surveys in the project area; however current chestnut-sided warbler populations in the project area likely are low.

The golden-winged warbler also is associated with woodland and high-elevation early successional forest habitats. Because it is the focus of this project, the effects of the various alternatives on golden-winged warblers are disclosed in a separate section below.

Effects of Alternative 1 (No Action)

Direct Effects - Crown closure, leaf fall and subsequent shading will effectively eliminate any surviving grass or such other herbaceous species as responded to the hurricane and salvage logging events. The exceptions will be the road banks and power line right-of-way maintained as open by brush cutting. With no action, habitat for chestnut-sided warblers and other species associated with high elevation early successional habitat will remain limited.

Indirect Effects - Barring severe natural disturbance, the project area will remain a dense, closed-canopy forest of increasing age and uniformity in structural characteristics. Shade-tolerant and fire-intolerant understory species will continue to develop slowly in diameter, height, and root volume. In particular stands regenerated by Forest Service actions in the past three decades will slowly self-prune and self-thin due to competition and open up the forest floor for re-establishment of species such as red maple, dogwood, sourwood and white pine that were reduced by site preparation actions at the time of stand establishment and retarded from re-establishing by heavy shade.

Cumulative Effects - Canopy heights, tree density, canopy cover percentage, stand average tree diameters, understory species composition and related vegetation attributes will become more similar over time. Barring intense natural disturbance, species and structural diversity will decline in comparison with that which existed in the 1970's, 1980's and soon after Hurricane Opal. Habitat for chestnut-sided warblers and other species associated with high elevation early successional habitat will remain limited.

Effects of Action Alternatives

Direct effects - Only two small areas on the edge of the project area are above 3000 feet elevation. These two areas over 3000 feet are within each one of the three action alternatives. One is an approximately 3 acre area on the crest of Brawley Mountain itself. The other is approximately 50 acres surrounding the crest of Tipton Mountain in the north-central part of the project area. Each of these locations is on the watershed divide and neither is completely included in the affected stands. Only about one to one and one-half acres of the Brawley Mountain peak are over 3000 feet and also within the affected stands. Only about five acres of the 50 acres or so on Tipton Mountain is over 3000 feet and also in the affected stands. The primary reason more of the Tipton mountain crest is not being included is because visual change from timber cutting and removal activities would be within the foreground viewshed of the Benton MacKaye Trail.

The table below details how the treatment acres are distributed by: (a) residual canopy cover, (b) treatment intensity, (c) alternative, and (d) elevation bands.

Table 18. Treated Acres by Elevation Range, Residual Canopy Cover and Alternative

Elevation Range in Feet Above Mean Sea Level	Objective Canopy Cover in Percent and Treatment Intensity					
	0-20 (High)		21-60 (Med)		> 60 (Low)	
	Acres by Alternative					
	Alt. 2	Alt. 3 & 4	Alt. 2	Alt. 3 & 4	Alt. 2	Alt. 3 & 4
2000 - 2200	0	0	1	1	0	0
2200 - 2400	32	32	128	85	95	0
2400 - 2600	61	58	190	79	36	0
2600 - 2800	69	60	66	32	0	0
2800 - 3000	34	29	13	13	0	0
> 3000	5	5	0	0	0	0
Subtotal	201	184	398	210	131	0
% of Alt. Acres	27	47	55	53	18	0

Initially early-successional forest conditions would occur in all of the area with a 20-percent or less canopy cover; that is, the High intensity treatment. The Medium intensity treatment would initially have approximately one-half of its acreage in early-successional forest conditions. The Low intensity treatment would not have effective early-successional forest habitat.

The table below compares how treatment acres are distributed by elevation between the alternatives. The three action alternatives are very similar in their percentage of treated acres occurring below 2200 feet but very different in the number of treated acres in this range. Conversely, at the highest elevations; that is, above 2800 feet, the acreage is similar but the percentage of the treated acres is quite different. The mid-elevation band of between 2400 and 2800 feet also has significant shifts between Alternative 2 and Alternatives 3 and 4.

The proposed timber harvest will enhance conditions for chestnut-sided warblers and other species associated with high elevation early successional forest habitats. The canopy opening on the ridgetops/upper slopes and mid-slope areas will result in the development of a dense shrub cover that will provide abundant nesting habitat. Although the treatment acres above 3000 feet elevation are limited, chestnut-sided warblers are expected to respond to the canopy opening at lower elevations (2400 feet and greater) as well. The subsequent prescribed burning, chainsaw felling and selective herbicide treatment will reduce the shrub cover to some degree. The intensity of these treatments will be less on mid-slope sites and these areas will retain significant shrub cover. Although the area will be managed to maintain woodland conditions, portions of the area will continue to provide suitable habitat for species like chestnut-sided warblers that are more typically associated with early successional forests.

Table 19. Distribution of Treated Acres by Alternative and Elevation Band

Elevation Range in Feet Above Mean Sea Level	Alternative 2		Alternatives 3 and 4	
	Acres	Percent of the Alternative Acres	Acres	Percent of the Alternative Acres
2000 - 2200	1	0.1	1	0.3
2200 - 2400	255	34.9	116	29.5
2400 - 2600	287	39.3	137	34.9
2600 - 2800	135	18.5	92	23.4
2800 - 3000	47	6.4	42	10.7
> 3000	5	0.7	5	1.3
Total	730	99.9	393	

Indirect effects - The ‘initial’ conditions of a transitional early-successional forest would persist approximately 3 to 5 years, or until there had been at least two burns if no herbicide treatment or one burn and a herbicide treatment. Vegetation composition will gradually shift away from early-successional forest conditions toward woodland conditions on the ridge crests and upper slopes. The transition will occur gradually with a decreasing density of shade tolerant and fire intolerant woody stems accompanied by a gradual increase in native grasses and broad-leaved forbs. Along this continuum of change early-successional forest and woodland conditions will be intermixed in two ways: (1) by the adjacency of the high and medium intensity treatments, and (2) by the natural response to logging and fire within each of these treatment intensities.

Cumulative effects - Woodland areas will be characterized by an open and irregularly-distributed high canopy, primarily of oak, and a irregularly-distributed ground cover of native grasses, particularly blue stem; fire-tolerant shrubs such as huckleberry and broad-leaved forbs such as goldenrod, woodland sunflower, tick trefoil and coreopsis. Mid-slope positions with more residual canopy and less intense fire will have less herbaceous and greater numbers of woody species per acre in comparison with ridgetop locations.

High-elevation early successional forest habitat used by the chestnut-sided warbler is limited on the Brawley Mountain project area and the Forest as a whole. The revised Forest Plan has an objective to create and maintain a high elevation early successional component on the Forest, and chestnut-sided warbler populations are expected to increase through the implementation of the Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), chestnut-sided warbler populations have declined on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that chestnut-sided warbler populations have increased on the Chattahoochee-Oconee National Forest over this same time period, however sample sizes are relatively low. There are no additional activities planned for the Brawley Mountain project area that would affect the availability of high elevation early successional forests. Therefore no cumulative effects to chestnut-sided warblers or their habitat are expected.

Effects of Alternative 2 (Proposed Action)

Direct Effects - Alternative 2 would create about 400 acres of transitional early successional forest habitat initially. Of this, about 6 acres would be above 3000 feet elevation. In addition, it would also create 47 acres of early successional forest habitat in the 2800 to 3000 foot elevation range. Total treatment area above 2800 feet is thus 52 acres, which is about 7-percent of the treated acres in the alternative.

Because it includes the greatest number of treatment acres, this alternative would provide the greatest benefit to species associated with high elevation early successional forests such as chestnut-sided warblers.

Indirect Effects - Woodland conditions would be created on about 600 acres by about five years post-harvest. Of this amount, 400 acres would come from the transition of early-successional forest habitat to woodland. Dormant season burning will first gradually reduce the number and size of woody stems and making available a habitat niche for grasses and forbs.

Cumulative Effects - Cumulative effects relative to early-successional habitats will be as previously described.

Effects of Alternative 3

Selective herbicide treatment will be used to kill the stump sprouts from the root crowns of established rootstocks. For each rootstock eliminated a habitat niche would be made available for native grasses and forbs. Unlike burning, which would take several dormant season burning cycles to begin to deplete starch reserves of rootstocks, herbicide would remove them in one year. Woodland conditions would be achieved with one burn followed by a herbicide treatment.

Direct Effects - Alternative 3 would create about 400 acres of transitional early successional forest habitat initially. Although it has five less acres above 2800 feet than does Alternative 2; it has nearly twice as high a percentage of the activity acres in that elevation range.

As compared to Alternative 2, the benefits of this alternative to high elevation early successional species such as chestnut-sided warbler will be less than in Alternative 2 due to the reduction in acres of timber harvest, especially in the mid-slope areas.

Indirect Effects - Woodland conditions would be created on about 400 acres by about five years post-harvest. Of this amount, 300 acres would come from the transition of early-successional forest habitat to woodland.

Cumulative Effects - Cumulative effects relative to early-successional habitats will be as previously described.

Effects of Alternative 4

Alternative 4 would have the same direct, indirect, and cumulative effects as alternative 3 with one major difference; the rate of the change from early-successional forest to woodland conditions. Burning alone will not shift composition to a woodland condition with a significant herbaceous ground cover except slowly over a long period of time.

Although the treatment acres in this alternative are similar to Alternative 3, without the use of herbicides to control woody sprouts, the degree of herbaceous species development likely will be less. Even with repeated burning, a more shrub-dominated condition is expected. The increased shrub cover will benefit chestnut-sided warblers and other species associated with high elevation early successional forest conditions.

Element - Old Growth

The Region 8 old growth policy implemented in the forest plan was published in “*Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region*” (Forest Service, 1997). Background information on old growth is found in Chapter 3 of the Final Environmental Impact Statement for the Forest Plan revision (Forest Service, 2004a). This information is available online at <http://www.fs.fed.us/conf/200401-plan/FEIS-3B1.pdf>. Forest-wide old growth management direction is found in Chapter 2 of the Forest Plan (Forest Service, 2004b). Chapter 2 is available online at <http://www.fs.fed.us/conf/200401-plan/FEIS-3B1.pdf>. In addition; Appendix D of the Plan describes the strategy followed by forest personnel in implementing the regional old growth policy in the forest plan revision (Forest Service, 2004d). It is available online at http://www.fs.fed.us/conf/200401-plan/6-PA_D.pdf. These resources are being incorporated by reference. Their content will not be repeated here but summarized as applicable to this specific project.

The Regional old growth guidance recognized that “...*old growth is typically distinguished from younger growth by several of the following attributes:*”

- (1) large trees for the species and site,*
- (2) wide variation in tree sizes and spacing,*
- (3) accumulations of large-sized dead standing and fallen trees that are high relative to earlier stages,*
- (4) decadence in the form of broken or deformed tops or boles and root decay,*
- (5) multiple canopy layers,*
- (6) canopy gaps and understory patchiness.”*

From these six characteristics, four major criteria (defining criteria) were derived for operational field use to identify existing old growth. They are as follows:

1. a minimum age in the oldest age class,

2. a minimum stem density (as measured by 'basal area') of stems 5-inches in diameter at 4.5 feet above the ground,
3. the diameters at breast height (dbh); that is, 4.5 feet above the ground of the largest trees, and
4. no obvious human-caused disturbance that conflicts with old growth characteristics.

Each of the first three criteria has a quantitative value within each of sixteen different old growth community types. All four criteria have to be met before a stand qualifies as **existing** old growth. If the first criteria (age) is met, a stand is **potential** old growth until such time as additional data collection identifies whether or not the remaining three criteria can be satisfied.

The old growth guidance further provides that the age criterion is applicable when at least 6 to 10 trees per acre for the pine forest community types and '*at least 30 trees per acre for some deciduous community types are present.*' The '*Guidance*' is not completely clear but it seems that this number is to be in the oldest age class, not just of any age. It also does not specify what is meant by '*some deciduous community types*'. Consistent with other language in the document, it would seem that fire-intolerant rather than fire-adapted communities are meant. Examples applicable to the Chattahoochee include the 'mixed mesophytic' and 'river floodplain hardwood forest' old growth community types. It also provides that "*as a conservative rule of thumb*" the minimum number of trees to be present in the largest diameters-at-breast-height (d.b.h.) will also be "*at least 6 to 10 trees/acre.*"

The six old growth characteristics were reflected in the defining criteria as follows:

- (i), characteristic # 1 – large trees - is reflected in criteria #3,
- (ii) characteristic # 2 – variation- and the '*canopy gap*' portion of characteristic # 6 are reflected in criteria #2, and
- (iii) characteristics # 3 – down woody - and # 4 – decadence - are implicit in criteria #1.

Characteristics 3, 4, 5 and the latter part of 6 were not made an explicit and quantitative part of the defining criteria. This was for two reasons; (1) the identified characteristics vary widely quantitatively among old growth communities, and (2) in order to be conservative – that is, tend to identify more old growth rather than less.

The '*Guidance*' also noted that "*Old growth in fire-dependent forest types may not differ from younger forests in the number of canopy layers or accumulation of down woody material.*" Of the forest types affected within the proposal, only shortleaf pine would be 'fire dependent'. The 'white oak-red oak-hickory' forest type would likely be considered 'fire-adapted' rather than fire dependent at the present time.

The '*Guidance*' also explicitly identified for two of the old growth communities types that occur on the Chattahoochee that woodland, grassland and savanna conditions are part

of the diversity of old growth conditions. These two old growth community types are; (1) type 22 – ‘dry and xeric oak forest, woodland, and savanna’ and (2) type 24 – ‘xeric pine and pine-oak forest and woodland’. By the inter-relationship between basal area, minimum diameters and minimum number of trees, the ‘*Guidance*’ also implied that open canopy conditions were a part of the old growth diversity within other old growth community types as well but avoided attempting to completely define that inter-relationship. That is, it is in the nature of old growth to have an open canopy rather than a closed one in which tree crowns touch tree crowns across the entire area.

Measures for Effects Analysis

The effects to old growth will be measured using five parameters.

1. The ability to satisfy the old growth conservation requirements of the forest plan.
2. The age of each affected stand,
3. The stem density post-treatment (as measured by ‘basal area’) of stems 5-inches in diameter at 4.5 feet above the ground,
4. The diameters at breast height (dbh); that is, 4.5 feet above the ground of the largest trees, and
5. No obvious human-caused disturbance that conflicts with the old growth characteristics of:
 - (a) snags and down woody,
 - (b) decadence,
 - (c) multiple canopy layers, and
 - (e) understory patchiness;

that is, the “*old growth characteristics*” that could be affected by the proposed activities.

In addition, the influence of time will be included by considering various time scales.

Direct effects

The measure for old growth direct effects is the number of acres with tree removal having trees of an age meeting the minimum old growth age criteria of the applicable old growth community type as of 2007. This measure responds directly to the first part of old growth scoping comments.

Indirect effects

The measure for old growth in direct effects is the number of acres precluded from qualifying as old growth when minimum old growth age is reached as a foreseeable result of activities of this project. This measure responds directly to the second part of old growth scoping comments.

Cumulative effects-

The measures for cumulative effects are:

(1) the acres & percent of the affected 6th level hydrologic unit(s) in old growth or old growth compatible management prescriptions. This measure is responsive to Forest Plan old growth direction.

(2) the rate of increase of stands meeting minimum old growth age in excess of the rate of implementation of non-compliant management activities at the scale of the 6th level watershed.

The bounds of the analysis are as follows:

Spatial

For compliance with the forest plan and for cumulative effects, the analysis is bounded in space by national forest ownership within the watershed divide ridges that define the 6th level hydrologic unit(s) of which the project area is a part. This bound is required by the forest plan. It is specified in the plan because 6th level hydrologic units are the spatial basis for developing a network of old growth conservation areas and regional old growth policy required that such a network be provided. The analysis does not consider private lands in the watershed. Private wooded land could in future provide old growth but such provision is counter to most of the current and expected land use pressures.

For direct and indirect effects of this proposed project, the spatial bound is the aggregate area receiving treatments within each alternative.

Temporal

The analysis has several time bounds for different purposes.

For direct effects, the time frame is 5 to 6 years into the future, long enough for the full series of sequential proposed actions to have occurred.

For indirect effects, the analysis considers the effects of the current proposal on the ability of the affected stands to meet the other old growth criteria when they have aged sufficiently to meet the minimum old growth age. In other words, the analysis seeks to identify whether or not affected stands would fail to meet old growth criteria in the future as a consequence of actions today.

For cumulative effects, the time period is ten to fifteen years into the future; that is, till 2017 to 2022 for reasonably foreseeable future

management actions in cumulative effects. The forward time bound is chosen because after this time a revision to the plan will occur and old growth direction may change. In addition, it is also at or near the furthest limits of reasonably foreseeable future events. The cumulative effects analysis extends backward in time to the birth-year of the oldest affected stand, which is 1900.

Existing Conditions:

The forest cover types of the Brawley Mountain project area as it was originally scoped and their applicable old growth community types are shown below. This summary is for those stands having treatments in the original proposed action. Alternatives 3 and 4 are a subset of this area; that is, no acres are added in the creation of these two alternatives.

The forest type to old growth crosswalk is that used in the plan revision, as explained in the Plan EIS. The ‘white oak-red oak-hickory’ forest type (numeric code 53) was split into two old growth types based on the productivity of the sites involved. Productivity in this particular project is expected to be an indirect expression of the water relations with drier locations such as ridges and upper south or west slopes having lower productivity and being assigned to old growth type 21 ‘dry & dry/mesic oak-pine’. Easterly aspect slopes, mid-slopes and valleys are water-retaining and/or water-gaining locations with higher productivity and are assigned to old growth type 5 ‘mixed mesophytic’.

Table 20. – Old Growth Community Types of the Brawley Mountain Proposed Action

Forest Type Code and Name	Old Growth Community Type Code and Name	Acres	% of Area
03 – white pine	02 – conifer/northern hardwood	84	11.4
53 – white oak-red oak-hickory	05 – mixed mesophytic	118	16.0
56 – yellow poplar-white oak-red oak	05 – mixed mesophytic	231	31.4
53 – white oak-red oak-hickory	21 - dry/mesic oak forest	269	36.5
32 – shortleaf pine	25 – dry & dry/mesic oak-pine	21	2.9
10 – white pine-upland hardwood	25 – dry & dry/mesic oak-pine	13	1.8
		736	100

Source: GIS stands data layer and forest type to old growth type crosswalk in Plan EIS.

Old growth community type 21 typically occurs along ridge crests or upper slopes that either have a water-losing topographic position or an inherently low water-holding capacity because of low soil volume and/or soil texture. These are the areas proposed for the greatest amount of canopy reduction. Old growth type 5 – mixed mesophytic typically occurs along valley bottoms, lower slopes of west or south-facing slopes, and northerly or easterly-facing (terrain-shaded) side slopes. These locations are either water-gaining or are water-holding and are of higher productivity than those of old growth type 21. These topographic locations are areas proposed for moderate reduction in canopy cover. Old growth type 25 is similar to type 21 except in having either a mixed hardwood-conifer composition or in having a higher productivity for its current forest cover than is typical

for that cover type. The white pine in old growth type 2 is a ‘habitat generalist’ and established with successful fire control soon after 1900 or is plantations established by Forest Service management.

The minimum parameters for each of the quantitative and biological criteria of the old growth community types that occur in this project are shown in the table below.

Table 21. Parameters of the Old Growth Types of the Brawley Mountain Project.

Old Growth Type	Min. Age of Oldest	Min. Basal Area (stems > 5” dbh)	DBH of Largest Trees	Basal Area of a Single Largest Tree	Number of trees in largest class needed to meet 40 BA/ac
02 – conifer/northern hardwood	140	40	>= 20	2.18	18
05 – mixed mesophytic	140	40	>= 30	4.91	8
21 - dry/mesic oak forest	130	40	>= 20	2.18	18
25 – dry & dry/mesic oak-pine	120	40	>= 19	1.97	20

Note that in any old growth type the oldest trees are not of necessity the largest in diameter. For example, on a wide range of site qualities and within a rather wide range of age difference, white pine will typically be of larger diameter than any of its associated species.

The forest plan requires project work to assess whether or not at least 5-percent of the area of the 6th level hydrologic unit affected by the project is in either an old growth or old-growth compatible management prescription. (An ‘old growth compatible prescription’ is one with no objective for early-successional forest habitat such that regular, periodic tree removal would be required.) If there is provision for at least 5-percent of area old growth conservation, no further old growth allocation is required. If that condition is not met, then additional provision for old growth conservation is required. The additional amount is to be at least the project areas’ ‘fair share’ based on its national forest area as a fraction of the entire 6th level hydrologic unit’s national forest area.

Only one 6th level hydrologic unit is affected by any of the alternatives. The plan management prescription allocations, their compatibility with old growth conservation, the acres of each, and the percentage of the national forest in the affected watershed are identified below.

Table 22. Forest Plan Management Prescriptions of the Affected 6th Level Hydrologic Unit and Their Compatibility with Old Growth Conservation.

Management Prescription	OG Compatible?	Nat. For. Acres	% of HU
3.C National Recreation Areas	No	46	0.5%

4.F Scenic Areas	No	432	4.9%
4.F.1 Scenic and Wildlife Management Areas	No	1,494	17.1%
4.H Outstandingly Remarkable Streams	No	262	3.0%
7.E.1 Dispersed Recreation Areas	No	4,887	56.1%
7.E.2 Dispersed Recreation Areas with Vegetation Management	No	948	10.9%
8.A.1 Mid- to Late-Successional Forest Emphasis	No	644	7.4%
9.H Management, Maintenance, and Restoration of Plant Associations	No	6	0%
Total		8,719	100%

Source: GIS analysis of relationship between plan prescriptions and 6th level HU boundaries

The analysis at the scale of just the affected 6th level hydrologic unit shows that there is not currently 5-percent in either old growth or old growth compatible prescriptions. In that instance, the plan requires the ‘*incremental progress*’ toward the old growth network. That progress is to designate a portion of the 5-percent standard equal to the proportion of the 6th level watershed affected by the activities of the project being considered. In this case, the 700 acres affected by the proposed action is 8-percent of the national forest in the watershed. Eight percent of the required 5-percent old growth provision is $(8,719 \text{ acres} \times 0.05 = 436 \text{ acres} \times 0.08 = 35 \text{ acres})$. Accordingly a 35-acre stand in the watershed and in the vicinity of the project has been allocated to management prescription 6.B ‘Areas Managed to Restore/Maintain Old Growth Characteristics’.

Stands affected by this proposal were re-inventoried and re-mapped to update their existing condition. A shape file of these stands was made for use in GIS and the attributes of these stands; such as forest cover type, age and acres was also updated. These updated stands and attributes were used for this old growth analysis. The age used for comparison to the minimum old growth age was calculated using 2007 as the base year.

Each stand having at least one acre affected by the activities of the proposal was analyzed for its old growth community type and its ability to meet the minimum old growth age for that type. This was a conservative approach because as a practical matter the Forest Service would typically avoid including small areas of very different species composition and structure. Ages of affected stands were field checked in response to scoping comments received that specific stands or locations were – or might be – old growth. Field checking consisted of choosing a well-distributed sample of trees representative of the oldest age class in the stand, coring them with an increment borer, and counting the growth rings. Trees thought to represent the oldest age class were chosen based on experience considering species, species physiology, terrain location, fire tolerance, crown geometry, diameter and overall form.

The result of these efforts and subsequent analysis was to demonstrate that none of the affected stands met the minimum old growth age for their respective old growth type. The closest any came was four acres in stand 23 which could reach minimum old growth age in 2034. Almost 40-percent of affected stands will – barring natural disturbance –

reach minimum old growth age between the years 2037 and 2047. More than half the affected stands will not reach minimum old growth age for fifty years or more.

Effects of Alternative 1 (No Action)

Direct Effects

There are no direct effects to old growth of not implementing the proposed project.

Indirect Effects

The stands affected in the other alternatives would continue to age and move toward satisfying each of the four defining old growth criteria, provided that natural disturbance or an un-planned un-natural occurrence such as gypsy moth so severe as to cause them not to do so does not occur.

Cumulative Effects

The net effect of past, currently proposed or decided, and reasonably foreseeable future Forest Service projects is a trend of increasing land area with tree cover old enough to satisfy the minimum old growth age criteria within the 6th level hydrologic unit.

The effects of past activities have already been accounted for by considering stand ages. No other past effects relative to old growth are continuing.

No other Forest Service activities currently proposed, in progress, or decisions unimplemented that would affect existing or potential old growth exist in this 6th level hydrologic unit. Future project decisions will have their own old growth effects analysis and consider the incremental effects of other projects, including this one, to old growth.

Effects Common to Each Action Alternative

The effects to old growth are similar in each action alternative and these common effects are being shown here. Greater detail will be addressed in the section on each individual alternative.

A summary of the effects relative to old growth criteria are shown in the table below. This table provides the context to understand the more detailed effects for each alternative.

Table 23. Post-treatment Basal Area and Approximate Number of Trees by Canopy Cover Percent.

Percent Residual Canopy	Residual Basal Area/Acre Range* (ft²)	Average Residual Basal Area/Acre (ft²)	Range in the Number of Trees/Acre in Residual Basal Area if All Are Equal to 20" DBH	Average Number of Trees/Acre if All are Equal to 20" DBH
0 to 20	0 to 30	15	0 to 14	7
21 to 60	31 to 80	55	14 to 37	25
> 60	> 80	> 80	More than 37	> 37

* *Source: Based on work by Greenberg, 2000*

Direct Effects

Criterion # 1 - Age

No affected stands in any action alternative are old enough to meet the age criteria to qualify for old growth. There are no direct effects to existing or potential old growth.

Criterion # 2 – Basal Area

Only on the ridge crests and upper slopes could the residual basal area after logging and burning drop below the minimum required for the old growth community type in the near term. Remaining areas with a higher residual canopy cover will retain more than enough basal area to prospectively meet the basal area requirement when the minimum old growth age is reached. Timber harvest will create ‘*canopy gaps*’ and thus be compatible with this particular old growth characteristic.

Criterion # 3 - Diameter

On the ridge crests and upper slopes the residual canopy cover range of 0 to 20 could be met with trees too small to grow to reach 20 inches by the minimum old growth age. That is, the minimum dbh criteria would not be met at the same time as the minimum old growth age is reached but could still be later. This could be an example of a human-caused disturbance that conflicts with old growth characteristics. This effect could be mitigated by retaining an average of at least six trees/acre that are now – or prospectively will be at minimum old growth age – at least 20 inches in diameter; provided trees of this size are currently available in the affected stands in numbers and distribution that could satisfy this requirement. Some of the affected stands are currently too young to have such trees. This effect would not occur in other treated areas because there will be far more than enough trees in the largest diameters to meet the criteria.

Criterion # 4 – Obvious conflicts

(a) snags and down woody,

A direct effect of logging will be to create large (greater than 4 inches in diameter) down woody material on the ground from un-merchantable topwood, rotten cull trees, and knocked down stems less than 5 inches in dbh. This effect will occur within all harvested areas. Follow-up prescribed burning will not necessarily consume large woody because under typical burning conditions woody material larger than about 2 inches in diameter will not be consumed except incrementally as it decomposes and becomes available fuel. In addition, a direct effect of the first and second prescribed burns will be top-kill of scattered residual trees; such as those with down woody material around their boles. Thus standing snags – another attribute of old growth – will initially be created. These effects are not in conflict with old growth characteristics.

(b) decadence,

Timber harvest will create some minor amount of damage to residual stems that will promote the entry of wood-rotting fungi, water, and boring insects that will contribute to ‘decadence’. Tree falling will break some limbs in the crowns of residual trees. Skidding and/or excavation will scuff shallow tree roots. And the boles of a minor number of residual trees are likely to be bumped and the bark knocked off during skidding operations. Prescribed burning will fire-scar some stems, especially those with an accumulation of fuels around their base. Each of these wounds will promote ‘decadence’ compared to existing conditions rather than conflict with it as an old growth characteristic.

(c) multiple canopy layers,

Either of the combinations of; (a) timber harvest, felling of un-merchantable stems, and prescribed burning or (b) timber harvest, felling of un-merchantable stems, prescribed burning, and herbicide will reduce the number of canopy layers compared to existing conditions, which is typically three layers; that is, a high canopy at 60+ feet, a mid-story canopy of about 30 feet, and an understory canopy of about 12 to 20 feet. If low-growing shrubs are present, such as huckleberry, a fourth layer may occur. After harvest each existing layer will likely remain but at reduced density due to physical removal of merchantable stems or breakage of un-merchantable stems. Prescribed burning will physically remove by top-kill most of the stems less than about 4-inches in diameter at the ground on the ridge crests and upper slopes as well as the mid-slope positions. Valley bottom and lower slopes positions will have a small reduction in the number of stems but no canopy layer will be completely removed in these areas because the fire intensity will not be high enough to reach lethal temperatures. When the woodland condition is fully achieved, there will be two canopy layers, both ‘patchy’; (1) the high canopy of the largest trees, and (2) a very open (low density) shrub-stump sprout canopy.

A reduction in the number of canopy layers is a conflict with old growth characteristics and it will be obviously human-caused in the short term. In the long term it will not be obviously human-caused though the reduction in the number of canopy layers in comparison with nearby untreated areas for instance will continue to be obvious.

(e) understory patchiness.

Timber harvest and prescribed burning will immediately shift woody species composition more toward oaks, yellow pine and fire-dependent or fire adapted woody understory. The number of stems; that is, frequency of occurrence, of fire-intolerant and shade tolerant species such as red maple, dogwood, white pine, sourwood and black gum will greatly decrease. There are approximately 400 stems per acre of these and similar species. (*See 'Successional Habitats' topic.*) 'Off-site' species such as yellow poplar on the ridge crests and sun-exposed slopes will also be reduced or even locally eliminated by the combination of harvest and burning. With the exception of white pine, all these species sprout vigorously from the root collar if cut or top killed by burning. Species such as huckleberry – if present – will increase. Where herbicides are used to selectively treat stump sprout clumps, the understory will be very open. The effect of the activities in combination will be to promote understory patchiness and therefore not conflict with this old growth characteristic.

Indirect Effects

Criterion # 2 – Basal Area

Locations with the most tree removal by cutting, fire mortality, and herbicide treatment; that is, the ridge crests and upper west or south-facing slopes have primarily old growth community type 21 – dry & dry/mesic oak. These areas will have their basal area reduced to less than the minimum required average 40 square feet of basal area per acre such that these activities will prevent affected stands from qualifying as old growth when remaining trees reach minimum old growth age *when only the residual trees are considered*. However, this outcome is not certain. Before the minimum old growth age is reached in the affected stands, new seedling establishment and surviving stump sprouts can be expected to contribute toward returning the basal area to the minimum of 40 square feet even if harvest and burning temporarily dropped it below the minimum. It is not possible to be certain the inter-action of these factors *will* provide the requisite 40 basal area but it is possible to predict that basal area will gradually increase over time even with a burning regime

A minor amount of tree mortality can be expected to occur among the residual trees within the first 3 to 5 years that is not as a result of fire injury. Experience has shown that while this type of mortality can be expected, it will be of a few

scattered trees. Only if there was very little or no margin for error in satisfying the basal area criteria would this effect preclude meeting old growth.

Medium and low intensity treatment areas; that is, moderate to high residual canopy cover percent, will continue to meet the basal area criterion after treatment.

Criterion # 3 - Diameter

This criterion could also be violated on the ridge crest and upper slope locations if; (1) selected residual trees are not already 20 inches in DBH, or (2) they are not capable of growing fast enough to reach 20 inches by the minimum old growth age. Based on experience in increment coring hundreds of trees of the common species and across a wide variety of growing conditions and age, a conservative estimate of annual increase in diameter post-treatment would be two-tenths of an inch; that is, each annual growth ring would be one-tenth inch wide. The earliest any area could reach the minimum old growth age is twenty five years. In that time, residual trees would be estimated to increase in diameter by 5 inches (25 years X 0.2 inch/year). Therefore, residual trees now fifteen inches in diameter or larger can be expected to satisfy the DBH criterion at minimum old growth age. Only if selected residual trees were less than 15 inches would prospectively meeting this criteria be in jeopardy.

Residual trees will extend their limbs outward and produce a larger crown than they had before timber harvest. Prescribed burning will also fertilize residual vegetation. An indirect result will be increased diameter growth on the residual stems thus helping to ensure that the minimum diameter criterion is met at the time of the minimum old growth age. This effect was not factored into the estimate of two-tenths inch per year diameter growth in order to be conservative.

Medium and low intensity treatment areas will continue to meet the diameter criteria at minimum old growth age. Compared to upper slopes and ridges, the combination of higher productivity, reduced competition, the fertilization from burning, and faster growing species such as northern red oak and yellow poplar; these areas will have greater increase in diameters.

Criterion # 4 – Obvious conflicts

(a) snags and down woody,

Little or no large down woody directly created as a result of the actions of this proposal can be expected to remain until or beyond the minimum old growth age of the affected stands. Decomposition and burning in combination will change its form. Current harvesting will reduce the volume of wood available to become down woody compared to what would have been available if no harvest had occurred if growth does not compensate for the loss. The effects of growth will

not offset this loss on ridge crests and upper slopes and most likely will not on mid-slopes either. However, the criterion speaks specifically to a comparison to younger life stages., not a theoretical maximum. The initial selection for large diameter plus additional growth will ensure that post-treatment snags and down woody will be much larger in diameter than would be typical in younger stands.

(b) decadence,

Wood rotting fungi in wounds created by logging and fire will further the development of decadence into the future. Weakened limbs or boles will be more susceptible to breakage, further accelerating this process. Exposed trees may be lightning struck and – if they survive – will further contribute to this characteristic of old growth. Trees will also be more exposed to wind-caused breakage or uprooting. Falling trees may wound survivors and further accelerate decadence.

(c) multiple canopy layers,

Following harvest, and even with a frequent prescribed burning regime, there will be a gradual recruitment of stems from stump sprouts or newly-established seedlings of fire-tolerant species. The existing large and well-established rootstocks will continue to sprout for many years. Experience on the Cohutta District of the Chattahoochee has shown that over thirty years of dormant season prescribed burning has not eliminated vigorous stump sprouts of, for example, red maple, scarlet oak and sourwood. Fire intensity will also decline as the fuel load declines with less leaf and limb litter drop as woody stem density is decreased. ‘Dwell time’ or how long the flaming front stays in one place will also decrease as fuels shift toward lighter ‘flashier’ fuels, especially grass. With lower intensity and less dwell time, sprouts of fire tolerant species will survive low and moderate intensity and fast-moving surface fires burning in light leaf litter and low to moderately dense native bunch grass cover. There will be a very gradual recovery of canopy layers from conditions immediately after the first burn.

(e) understory patchiness.

Burning typically has wide variation in intensity, creating a ‘mosiac’ of effects. Variations in intensity, open canopy, and reduced litter layer are each conducive to either the establishment of new understory species or the expansion of existing occurrences. In addition, variation in intensity will affect survival of stump sprouts of existing root stocks. The net effect will be to have a much more ‘patchy’ understory than the existing dense stocking of small stems of common species.

Cumulative Effects

The effects of past actions on meeting old growth criteria have already been accounted for in the analysis by the stand age.

Current activities are not additive with the effects of past activities in terms of meeting the four defining old growth criteria.

The most-conflicting reasonably foreseeable future management action is the creation of early-successional forest habitat (ESFH). The dis-aggregation of the maximum plan ESHF objective amount to the Brasstown is 6,197 acres per decade within plan constraints. The area-proportionate 'fair share' of this affected 6th level watershed is 5.5-percent of that amount or 341 acres per decade or about 4-percent of all national forest in the watershed. Assuming this project area is representative of conditions at the scale of the entire 6th level hydrologic unit, approximately 40-percent by area of the 6th level hydrologic unit will reach minimum old growth age between 30 and 40 years from 2007. ESHF creation at current planned rates – even using the unlikely assumptions that; (a) it would all occur in the oldest age classes, (b) would continue unchanged for forty years, and (c) would always preclude meeting old growth criteria – could only preclude the old growth age from being reached on a maximum of 16-percent of the area (4 decades X 4-percent per decade). .

The next-most conflicting reasonably foreseeable future management action is the creation of woodland conditions. The dis-aggregation of the plan woodland objective amounts to the Brasstown is 2,080 acres per decade within plan constraints. The area-proportionate 'fair share' of this affected 6th level watershed is 5.5-percent of that amount or 114 acres per decade or about 1.3-percent of all national forest in the watershed. Again using the same unlikely assumptions that; (a) woodland is additive with ESHF as a loss of potential old growth, (b) the oldest stands are always chosen for woodland creation, and (c) woodland conditions are never compatible with meeting old growth criteria, the maximum cumulative effect is (4-percent + 1.3-percent X 4 decades) equals 21.2-percent; still only about one-half the recruitment rate into potential old growth.

Therefore, reasonably foreseeable future management actions will not preclude a significant increase in stands meeting minimum old growth age in the watershed.

Effects of Alternative 2 (Proposed Action)

Direct Effects

No affected stands currently meet old growth criteria. There are no direct effects to existing or potential old growth. The earliest the forest cover on any affected acreage meets minimum old growth age is in twenty-five years or in 2032.

Indirect Effects

Approximately 200 acres or 29-percent of the acreage of affected stands will probably be precluded from meeting all old growth criteria when the minimum old growth age is reached.

Cumulative Effects

Cumulative effects are the same as those presented for the 'no action'. This is because this alternative is not in addition to that analysis but is included within it.

Effects of Alternative 3

Direct Effects

Stands in this alternative are a subset of the proposed action. Therefore, as with the proposed action, no affected stands currently meet old growth criteria. There are no direct effects to existing or potential old growth.

Indirect Effects

Alternative 3 has approximately 390 treated acres with approximately 180 acres (45%) planned for a residual canopy cover ranging between 0 and 20-percent. This portion of the area will probably be precluded from meeting all old growth criteria when the minimum old growth age is reached. This alternative has this effect on 30-acres or 15-percent less than the proposed action.

Cumulative Effects

Cumulative effects are the same as those presented for the 'no action'. This is because this alternative is not in addition to that analysis but is included within it.

Effects of Alternative 4

Direct Effects

Stands in this alternative are a subset of the proposed action and are the same as in Alternative 3. Therefore, as with the proposed action and Alternative 3, no affected stands currently meet old growth criteria. There are no direct effects to existing or potential old growth.

Indirect Effects

This alternative is the same as alternative 3 except that it includes selective herbicide treatment of stump sprouts. Like alternative 3, approximately 180 acres (or 45-percent of treated area) will probably be precluded from meeting all old growth criteria when the minimum old growth age is reached.

Cumulative Effects

Cumulative effects are the same as those presented for the 'no action'. This is because this alternative is not in addition to that analysis but is included within it.

Element - Forest Interior Birds

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – Spatial: The spatial bound of the analysis area the block of National Forest lands from Highway 60 at Wilscot Gap west to Blue Ridge Lake encompassing approximately 5800 acres. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

Forest interior birds associated with contiguous blocks of mature forests. They avoid forest edges during nesting and can be sensitive to forest fragmentation. The Brawley Mountain project is located in a large contiguous tract of National Forest lands of approximately 5800 acres stretching from Highway 60 west to Blue Ridge Lake. This large block of forested habitat provides suitable habitat for forest interior birds. To the east of Highway 60, this area adjoins National Forest lands that comprise the large central core of the Forest. The surrounding private lands are a mixture of forest land, pastures, and residential development.

The revised Forest Plan identified the ovenbird as a MIS to help indicate the effects of management on species associated with interior forest habitats on the Chattahoochee National Forest. Ovenbirds are strongly associated with mature forest interior habitats (Hamel 1992, Crawford et al. 1981). They generally breed in closed canopy deciduous or mixed forests with limited understory. The availability of older hardwood stands on the Forest has increased over the last few decades. The ovenbird is a common breeding bird on the Blue Ridge Ranger District and has been reported from Breeding Bird Surveys in the Brawley project area. Given the availability of interior forest habitat, population levels likely are moderate.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to interior forest habitat are expected. Through time, the amount of

interior forest habitat will increase as the Forest matures. This should result in improved habitat conditions for the ovenbird and other species that utilize interior forest habitats.

Cumulative Effects - Landscape-scale habitat patterns influence the effects of forest fragmentation. Forest-level analysis indicates that the great majority of the Chattahoochee National Forest occurs within a landscape that is more than 70 percent forested (USDA Forest Service 2004a). In these forest-dominated landscapes, edge effects are not expected to significantly influence productivity of interior forest species. The Brawley Mountain area and surrounding National Forest lands provides an abundance of interior forest habitat and these habitats are common on the Forest as a whole. The availability of interior forest conditions and populations of ovenbirds and associated species are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), ovenbird populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that ovenbird populations also have been stable on the Chattahoochee-Oconee National Forest over this same time period.

Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Brawley Mountain that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – The treatments proposed under this alternative include timber harvest, prescribed burning, and herbicide application. The effects of this alternative on the ovenbird and other interior forest birds will vary across the treatment area, depending on the degree of canopy reduction. The timber harvest treatments proposed for the ridgetop and upper slopes would result in a substantial opening of the overstory canopy on approximately 200 acres. Residual canopy cover on these sites will be approximately 20%. The subsequent prescribed burning and herbicide application proposed for these sites will result in a reduction in the woody understory and an increase in herbaceous cover. These open conditions on the ridgetops would decrease habitat suitability for the ovenbird and other songbirds that prefer closed canopy conditions.

On mid-slope sites, a range of 20-60 percent canopy cover would be maintained after treatment. On these sites (approximately 395 acres), the effects to interior forest habitat would be more moderate. As a result of the canopy reduction, portions of these mid-slope sites will develop a relative dense understory, decreasing its habitat suitability for ovenbirds.

On the lower slopes of the project area (approximately 140 acres) the degree of canopy opening will be limited and a continuous forest canopy will be maintained on these sites. No herbicide treatments are proposed for these lower slopes and the prescribed burning intensity would be very low in these moist, lower slopes. The proposed treatments in

these lower slopes will not impact the availability of interior forest habitat or habitat suitability for the ovenbird.

Although habitat suitability for interior forest birds like ovenbirds will be decreased on portions of the Brawley Mountain project area, the availability of interior forest habitat will remain abundance in the analysis area. Through time, the amount of mature interior forest habitat will increase as forests in the analysis area mature. This should result in improved habitat conditions for the ovenbird and other species that utilize mature interior forest habitats.

There will be no direct effects of the herbicide application on ovenbirds or other forest interior birds. Hazard quotients (summarized in Appendix B, project folder) for small birds consuming contaminated insects are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure.

Cumulative Effects - While the Brawley Mountain area provides moderate levels of interior forest habitat; these habitats are abundant on the Forest as a whole. The availability of interior forest conditions and populations of ovenbird and associated species are expected to increase through the implementation of the revised Forest Plan (USDA Forest Service 2004a). Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), ovenbird populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that ovenbird populations also have been stable on the Chattahoochee-Oconee National Forest over this same time period.

Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Brawley Mountain that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected.

Effects of Alternative 3:

Direct and Indirect Effects – The direct effects of this alternative would be similar to Alternative 2. As in Alternative 2, habitat suitability for ovenbirds and other interior forest species will decline on the ridge-top and to a lesser degree, mid-slope sites. However, the acres of timber harvest in this alternative are less for both the ridgetop (approximately 180 acres) and mid-slope (approximately 215 acres) sites. No timber harvest activities are planned for the lower slope sites in this alternative.

Although habitat suitability for interior forest birds like ovenbirds will be decreased on portions of the Brawley Mountain project area, the availability of interior forest habitat will remain abundance in the analysis area. Through time, the amount of mature interior forest habitat will increase as forests in the analysis area mature. This should result in

improved habitat conditions for the ovenbird and other species that utilize mature interior forest habitats.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2. Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Brawley Mountain that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected.

Effects of Alternative 4:

Direct and Indirect Effects – The direct of this alternative would be similar to Alternatives 2 and 3. The acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. As in Alternative 3, habitat suitability for ovenbirds and other interior forest species will decline on the ridge-top and to a lesser degree, mid-slope sites as a result of the timber harvest activities. No timber harvest activities are planned for the lower slope sites in this alternative.

Although habitat suitability for interior forest birds like ovenbirds will be decreased on portions of the Brawley Mountain project area, the availability of interior forest habitat will remain abundance in the analysis area. Through time, the amount of mature interior forest habitat will increase as forests in the analysis area mature. This should result in improved habitat conditions for the ovenbird and other species that utilize mature interior forest habitats.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2. Additional residential development may decrease the availability of contiguous forest habitat on private lands. However, there are no additional activities planned for the Brawley Mountain that would affect the availability of interior forests. Therefore no cumulative effects to interior forest habitat and associated species such as ovenbird are expected.

Element - Permanent Openings, Old Fields, Rights-of Way, Improved Pastures

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – **Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation

Existing Conditions

There are no permanent openings, old fields, or improved pastures on the National Forest lands comprising the analysis area. There is a small acreage (< 10 acres) of rights-of-way associated primarily with the powerline on Brawley Mountain as well as the road shoulders and turnouts along the Brawley Mountain road. These sites are maintained through periodic mowing/saw down and contain a mixture of native grasses such as purpletop grass (*Tridens flavus*), bluestem grass (*Andropogon* spp.), Indian grass (*Sorghastrum nutans*), and panic grass (*Panicum* spp.), non-native grasses such as fescue, forbs, and woody seedlings and saplings. These narrow, linear features provide some limited wildlife benefits as brood-rearing habitat for species such as turkey and grouse, and nesting and foraging habitat for grassland species such as the field sparrow and bobwhite quail.

Adjacent private lands to the south of the analysis area are a mixture of forest land, open land, and residential development. There are several small pastures and fields along Georgia Highway 60 immediately south of the Brawley Mountain Area and larger farms approximately 2 miles south along the Toccoa River and Skeenah Creek.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects- Current management of the existing rights-of-way through periodic mowing/sawdown would continue under this alternative and no changes in habitat conditions are expected. These narrow, linear features would continue to provide some limited wildlife benefits.

Cumulative Effects - There currently are approximately 324 acres of maintained Rights-of-Way on the Chattahoochee National Forest, which represents less than 0.1 percent of the Forest (USDA Forest Service 2004a). Although they provide some limited wildlife benefits, these typically are managed by third parties for purposes other than to provide wildlife habitat. There are approximately 1300 acres of permanent openings on the Chattahoochee National Forest that are managed by US Forest Service and Georgia Department of Natural Resources personnel specifically to provide high quality wildlife habitat. Openings on adjacent private lands are not maintained in high quality habitat conditions. Many of the existing open lands on private land have recently been lost to residential development and this trend is expected to continue in the future.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – Of the activities proposed in this alternative, only prescribed and herbicide application will have any impact on the habitat conditions within the existing Rights-of-Way (ROW). For those portions of the ROW within the burning unit, the periodic prescribed burning will result in a reduction the size and to some degree, quantity of woody stems and an increase in herbaceous cover. Similarly, in the small ridgetop portion of the ROW, the selective herbicide treatment will reduce the number of woody stems and is expected to increase the amount of grasses and forbs.

These changes will be relatively minor and will not substantially change habitat conditions for species associated with these open habitats.

Cumulative Effects – The proposed activities will have minimal impacts to the habitat conditions within the existing ROW. Although more common on other portions of the Forest, there are no permanent openings, old fields, or improved pastures on the National Forest lands in the analysis area. There are no plans to create these any new permanent openings in the analysis area in the foreseeable future. Private lands will continue to provide most of the open habitats. However, openings on adjacent private lands are not maintained in high quality habitat conditions. Many of the existing open lands on private land have recently been lost to residential development and this trend is expected to continue in the future.

Effects of Alternative 3

Direct and Indirect Effects – In this alternative, the prescribed burning and herbicide treatments would be essentially the same as in Alternative 2. As discussed above, these treatments would result in some reduction of the woody vegetation and increase in the herbaceous vegetation in portions of the powerline ROW. These changes will be relatively minor and will not substantially change habitat conditions for species associated with these open habitats.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2. The proposed activities will have minimal impacts to the habitat conditions within the existing ROW. Private lands will continue to provide most of the open habitats. However, openings on adjacent private lands are not maintained in high quality habitat conditions. Many of the existing open lands on private land have recently been lost to residential development and this trend is expected to continue in the future.

Effects of Alternative 4

Direct and Indirect Effects – In this alternative, herbicides will not be used to control woody vegetation and proposed prescribed burning would be the only activity that would impact habitat conditions within the existing ROW. The burning would result in some reduction of the woody vegetation and increase in the herbaceous vegetation in portions of the powerline ROW. However these changes would be less than in Alternatives 2 and 3 and will not substantially change habitat conditions for species associated with these open habitats.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2. The proposed activities will have minimal impacts to the habitat conditions within the existing ROW. Private lands will continue to provide most of the open habitats. However, openings on adjacent private lands are not maintained in high quality habitat conditions. Many of the existing open lands on private land have recently been lost to residential development and this trend is expected to continue in the future.

SPECIAL HABITAT ATTRIBUTES

Element - Riparian Habitats

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – **Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation

Existing Conditions

There are several headwater streams in the project area. Most are small streams (1st and 2nd order) that due to their small size provide limited riparian habitat. Brawley Branch is the only major perennial stream in the project area. Lower portions of Brawley Branch are lower gradient and provide more extensive forested riparian habitat. Most of the existing riparian habitat is in mid to late successional condition. A portion of the riparian corridor along the right fork of Brawley Branch consists of an older (37 year-old) pole stand.

The revised Forest Plan identified the Acadian Flycatcher as the MIS to represent Mid-Late Successional Riparian Habitat Conditions. Habitat for the Acadian flycatcher consists of deciduous forests near streams (Hamel 1992). Preferred habitat for this species is moist bottomlands, swamps, and riparian thickets. Usually this bird builds its nest in branches directly overhanging streams. The Acadian Flycatcher has not been reported from Breeding Bird Surveys in the Brawley project area. However, most of survey points were in upland areas. The Acadian flycatcher is a common breeding bird on the Blue Ridge Ranger District and likely occurs in the project area. However, given the limited quantity of mature riparian habitat population levels likely are low.

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to riparian habitat are expected. Through time, the amount of mid-late successional riparian habitat will increase as the portions containing young forests mature. This should result in improved habitat conditions for the Acadian Flycatcher and other species that utilize mature riparian habitats.

Cumulative Effects- Mid-Late Successional forested riparian habitat is common on the Forest and the availability of these older riparian habitats and populations of Acadian Flycatchers and associated species are expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). Riparian Corridor standards will be followed on all projects on the Forest to maintain desirable habitat conditions in the riparian corridor. Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), Acadian Flycatcher populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et

al 2007). This analysis indicates that Acadian Flycatcher populations also have been stable on the Chattahoochee-Oconee National Forest over this same time period.

There are no activities planned for the Brawley Mountain area that would affect the availability of mature riparian forests. Therefore no cumulative effects to riparian habitat and associated species such as Acadian flycatchers are expected.

Effects of Alternative 2: (Proposed Action):

Direct and Indirect Effects - The thinning, prescribed burning, and herbicide application, have the potential to impact riparian habitat conditions. However, application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that desired conditions in the riparian corridor will be maintained and enhanced. These include provisions for controlling impacts from activities such as vegetation management, fireline construction, and trail construction. Major ground disturbing activities such as road construction (except at designated crossings) log landings and bladed firelines are prohibited in the riparian corridor. Within the riparian corridor, the degree of canopy opening will be limited and a continuous forest canopy will be maintained on these sites. Prescribed fire in the riparian zone will consist of low intensity, backing fires that will result in little change to the vegetation conditions in these areas. No herbicide application will occur within the riparian corridor. As a result of these measures, riparian habitat conditions and populations of associated species such as the Acadian Flycatcher will be maintained.

Through time, the amount of mid-late successional riparian habitat will increase as the portions containing young forests mature. This should result in improved habitat conditions for the Acadian Flycatcher and other species that utilize mature riparian habitats.

Cumulative Effects- Mid-Late Successional forested riparian habitat is common on the Forest and the availability of these older riparian habitats and populations of Acadian Flycatchers and associated species are expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). Riparian Corridor standards will be followed on all projects on the Forest to maintain desirable habitat conditions in the riparian corridor. Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), Acadian Flycatcher populations have been stable on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that Acadian Flycatcher populations also have been stable on the Chattahoochee-Oconee National Forest over this same time period.

There are no activities planned for the Brawley Mountain area that would affect the availability of mature riparian forests. Therefore no cumulative effects to riparian habitat and associated species such as Acadian flycatchers are expected.

Effects of Alternative 3:

Direct and Indirect Effects – In this alternative, all canopy thinning will be restricted to the ridgetops and upper and mid slope positions. No timber harvest activities are planned for the lower slope sites, including the riparian corridors in this alternative. Therefore existing canopy conditions in the riparian corridor will be maintained. As in alternative 2, no herbicide application will occur within the riparian corridor and prescribed fire in the riparian zone will consist of low intensity, backing fires that will result in little change to the vegetation conditions in these areas. As a result of these measures, riparian habitat conditions and populations of associated species such as the Acadian Flycatcher will be maintained.

Through time, the amount of mid-late successional riparian habitat will increase as the portions containing young forests mature. This should result in improved habitat conditions for the Acadian Flycatcher and other species that utilize mature riparian habitats.

Cumulative Effects: The cumulative effects of this alternative on riparian corridor habitat will be similar to Alternative 2.

Effects of Alternative 4:

Direct and Indirect Effects- In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. As with Alternative 3, all canopy thinning will be restricted to the upper and mid slope positions and no timber harvest activities are planned for the riparian corridors. The effect of this alternative on riparian corridor habitat will be similar to Alternative 3

Cumulative Effects: The cumulative effects of this alternative on riparian corridor habitat will be similar to Alternative 2.

Element - Snags, Dens, and Downed Wood

Measure - Effects on habitat conditions and populations of associated species from project activities.

Bounds of Analysis – **Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

Snags, dens, and downed wood are important habitat element for a variety of species of wildlife. Large snags are used as nesting and feeding sites and perches by birds, and

roosting and maternity habitat for bats. Den trees are used for nesting, roosting and hibernating by a variety of species. Downed woody debris provides cover and feeding sites for amphibians, reptiles, small mammals, and invertebrates. These elements are typically most abundant in older forests. Approximately 75 % of the Brawley Mountain area is greater than 60 years-of-age and 50 % is in late successional conditions (greater than 80 years-of-age).

The revised Forest Plan identified the pileated woodpecker as a MIS to help indicate the effects of management on species that utilize snags. Habitat consists of mature (60+ years) and extensive hardwood and hardwood-pine forest (Hamel 1992). Preferred habitat is primarily deep woods, swamps, or river bottom forests. The pileated woodpecker can also be found in rather open, upland forest of mixed forest types. This bird forages and nests on and in snags, with some foraging also occurring on fallen logs and other forest debris. This species requires snags for nesting and foraging. The Pileated Woodpecker is a common breeding bird on the Blue Ridge Ranger District and has been reported from Breeding Bird Surveys in the Brawley project area. Given the abundance of mid-late successional forest habitat, population levels likely are moderate to high.

Effects of Alternative 1 (No-Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to snags, dens, and downed wood are expected. Through time, the amount of mid-late successional habitat will increase as the forests in the area mature. This should result in improved habitat conditions for the Pileated woodpecker and other species that utilize snags, dens, and downed wood.

Cumulative Effects – Recruitment of snags, dens, and downed wood is most dependent on providing abundant late successional forests. The availability of these habitats and populations of pileated woodpeckers and associated species are expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). The revised Forest plan has several standards that ensure the retention and recruitment of snags and den trees. Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), Pileated woodpecker populations have been increased on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that Acadian Flycatcher populations have been stable on the Chattahoochee-Oconee National Forest over this same time period.

There are no additional activities planned for the Brawley Mountain area that would affect the availability of snags, dens, or downed wood. Therefore no cumulative effects to these habitat elements and associated species such as Pileated woodpeckers are expected.

Effects of Alternative 2 (Proposed Action):

Direct and Indirect Effects- The thinning and prescribed burning have the potential to impact the availability of snags, dens, and downed wood. However, Forest-wide

standards will be followed that ensure the retention and recruitment of these habitat elements on the landscape. These standards specify that standing snags and den trees will not be cut during vegetation management treatments unrelated to salvage unless necessary for insect and disease control or public safety. As a result, existing snags and den trees in the project area will be retained during the thinning associated with the woodland restoration.

The prescribed fire treatments proposed in this alternative may impact existing snags and downed wood. However, prescribed fire also is likely to result in tree mortality, creating new snags and downed wood. Overall, the quantity of available snags is expected to increase over time as a result of the periodic prescribed burns.

There will be no direct effects of the herbicide application on pileated woodpeckers or other snag-dependent species. Hazard quotients (summarized in Appendix B, project folder) for small birds consuming contaminated insects are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure.

Snags and downed wood are abundant in the project area and they will continue to be common with the implementation of this alternative. Periodic prescribed burning likely will result in an increased abundance of snags. This should result in improved habitat conditions for the Pileated woodpecker and other species that utilize these habitat elements.

Cumulative Effects – Recruitment of snags, dens, and downed wood is most dependent on providing abundant late successional forests. The availability of these habitats and populations of pileated woodpeckers and associated species are expected to increase through time with the implementation of the revised Forest Plan (USDA Forest Service 2004a). The revised Forest plan has several standards that ensure the retention and recruitment of snags and den trees. Based on recent analysis of breeding bird population trends on Southern National Forests (1992-2004), Pileated woodpecker populations have been increased on National Forests in the Southern Blue Ridge (La Sorte et al 2007). This analysis indicates that Acadian Flycatcher populations have been stable on the Chattahoochee-Oconee National Forest over this same time period.

There are no additional activities planned for the Brawley Mountain area that would affect the availability of snags, dens, or downed wood. Therefore no cumulative effects to these habitat elements and associated species such as Pileated woodpeckers are expected.

Effects of Alternative 3:

Direct and Indirect Effects – The direct effects of this alternative would be similar to Alternative 2. The acres of timber harvest will be less than Alternative 2 and will be restricted to the ridgetops and upper and mid slope positions. The implementation of Forest Plan standards will ensure the protection of existing snags during the timber

harvest activities. The prescribed burning block will be the same as in Alternative 2. While the prescribed fire treatments may impact existing snags and downed wood periodic burning also is likely to result in tree mortality, creating new snags and downed wood. Overall, the quantity of available snags is expected to increase over time as a result of the periodic prescribed burns. This should result in improved habitat conditions for the Pileated woodpecker and other species that utilize these habitat elements.

Cumulative Effects- The cumulative effects of this alternative on the availability of snags, dens, and downed wood and associated species such as the Pileated woodpecker will be similar to Alternative 2.

Effects of Alternative 4:

Direct and Indirect Effects- In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. The effect of this alternative on the availability of snags, dens, and downed wood will be similar to Alternative 3.

Cumulative Effects: The cumulative effects of this alternative on the availability of snags, dens, and downed wood and associated species such as the Pileated woodpecker will be similar to Alternative 2.

VIABILITY CONCERN SPECIES

Element - Aquatic Habitats Including Threatened, Endangered, Sensitive and Locally Rare Aquatic Species

Measure - Effects on habitat conditions and populations of aquatic species from project activities.

Bounds of Analysis – **Spatial:** Habitat Conditions in the streams in and immediately down stream of the stands where project activities are proposed. **Temporal:** Approximately 10 years following implementation

Existing Conditions

The only major perennial stream in the project area is the upper headwater portion of Brawley Branch and several unnamed 1st and 2nd order tributaries. At the lower end of the project area at FS road 35 road crossing, Brawley Branch is shallow and approximately 4 feet wide. The stream was surveyed by USFS personnel in October 2007. The only fish species found was banded sculpin although numerous crayfish and salamanders also were encountered. Due to their small size, the 1st and 2nd order tributaries are fishless.

Effects to federally-listed threatened and endangered, and Regional Forester Sensitive Aquatic Species are analyzed in detail in the Biological Evaluation for this project. These species are those for which there is concern for viability of their populations across

their range. Based on this analysis, 4 Sensitive Aquatics Species occur or potentially occur in the vicinity of the project. This was determined by: (1) consulting Forest Service aquatic inventory records, (2) consulting Georgia Natural Heritage Program (GNHP) records, (3) consulting University of Georgia (UGA), Forest Service, and Georgia Department of Natural Resources (GADNR) aquatic inventory records, (4) reviewing U.S. Fish and Wildlife Service county lists for potential species in Fannin County, (5) ongoing discussions with GNHP, Forest Service, and other agency biologists, (6) various scientific references such as technical manuals, NatureServe information, and others, and (7) results from project-level surveys.

Table 24. Aquatic Viability Concern Species known to occur or with potential to occur in the Brawley Mountain project vicinity.

Scientific Name	Common Name	Status
<i>Macromia margarita</i>	Margarita River Skimmer	S
<i>Ophiogomphus incurvatus</i>	Appalachian Snaketail	S
<i>Ophiogomphus edmunds</i>	Edmunds Snaketail	S
<i>Beloneuria georgiana</i>	Georgia Beloneurian Stonefly	S

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to aquatic habitat are expected. Routine road maintenance activities on FS roads 45 and 35 would continue including periodic grading and maintenance of existing drainage structures. With current levels of road use, along with regular maintenance, impacts to water quality and aquatic habitat from the existing roads should be minimal.

Cumulative Effects – The Chattahoochee National Forest has 2,436 miles of perennial streams, including 1,770 miles of cold water streams and 666 miles of cool water streams (USDA Forest Service 2004a). Riparian Corridor standards, forestwide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. There are no activities planned for the Brawley Mountain area that would affect the aquatic habitat conditions and therefore no cumulative effects are expected.

Effects of Alternative 2: (Proposed Action):

Direct and Indirect Effects - Sensitive species with the potential to occur in the streams of the Brawley Mountain Project Area include Margarita River Skimmer (*Macromia margarita*), Appalachian Snaketail (*Ophiogomphus incurvatus*), Edmunds Snaketail (*Ophiogomphus edmunds*), and Georgia Beloneurian Stonefly (*Beloneuria georgiana*).

The thinning, prescribed burning and herbicide application have the potential to impact aquatic habitat conditions. However, application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs) will ensure that water quality and aquatic habitat

conditions will be maintained and enhanced. These include provisions for controlling impacts from activities such as vegetation management, fireline construction, and herbicide use. As a result direct impacts to water quality and aquatic species will be minimal.

Ground disturbance will occur in the development of temporary roads, skid trails, and log landings during the commercial thinning operations. However, water quality and aquatic habitat will be protected in the project area by the delineation of riparian corridors and the implementation of the standards in the Forest Plan. Major ground disturbing activities such as roads and trails (except at designated crossings) and log landings are prohibited from the riparian corridor and all silvicultural activities within this corridor will be conducted to meet or exceed compliance with BMPs. Within the riparian corridor, the degree of canopy opening will be limited under this alternative.

Existing roads and streams will be used for the majority of the prescribed burn control lines. To minimize soil disturbance from fireline construction, use of heavy mechanized equipment (e.g. bulldozers) in wetlands or riparian corridors is prohibited. Hand lines will be used to create firelines near streams. Prescribed fire in the riparian zone will consist of low intensity, backing fires that will result in little change to the vegetation conditions in these areas.

Details of the herbicide risk assessment are summarized in Appendix B. Acute exposure hazard quotients to fish and aquatic invertebrates for accidental spills have calculated values over 1.0 for glyphosate and triclopyr ester (fish only). However, glyphosate is strongly adsorbed to (bound to the surface of) both organic matter and clay particles. Therefore it very immobile in the environment, and unlikely to reach aquatic habitat. Even in the unlikely event that it might reach the stream it would probably be quickly bound to sediment or organic matter in the stream. Triclopyr has limited soil mobility. With the provision of riparian buffer strips on stream zones, the risk is further reduced. This includes a standard that prohibits herbicide application within 100 horizontal feet of lakes, wetlands, or perennial or intermittent springs and seeps (FW standard FW-022). Mixing and dilution in flowing streams will minimize any potential hazard from any small spills which might occur during implementation of this project. No herbicide application will occur within the riparian corridor.

Cumulative Effects – Riparian Corridor standards, forestwide standards and Best Management practices (BMPs) will be followed on all projects on the Forest to protect water quality and aquatic habitat condition. There are no additional activities planned for the Brawley Mountain area that would affect the aquatic habitat conditions and therefore no cumulative effects are expected.

Effects of Alternative 3:

Direct and Indirect Effects – In this alternative, all canopy thinning will be restricted to the ridgetops and upper and mid slope positions. No timber harvest activities are planned for the lower slope sites, including the riparian corridors. As a result, ground disturbance

in the riparian corridor will be minimal. As in alternative 2, no herbicide application will occur within the riparian corridor and prescribed fire in the riparian zone will consist of low intensity, backing fires that will result in little change to the vegetation conditions in these areas. As a result of these measures, water quality and aquatic habitat conditions will be maintained.

Cumulative Effects: The cumulative effects of this alternative on aquatic habitats will be similar to Alternative 2.

Effects of Alternative 4:

Direct and Indirect Effects- In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. As with Alternative 3, all canopy thinning will be restricted to the upper and mid slope positions and no timber harvest activities are planned for the riparian corridors. The effect of this alternative on aquatic habitats will be similar to Alternative 3

Cumulative Effects: The cumulative effects of this alternative on aquatic habitats will be similar to Alternative 2.

Element – Terrestrial Threatened, Endangered, Sensitive Species and Locally Rare Species

Measure - Effects on habitat conditions and populations of Terrestrial PETS and Locally Rare species from project activities.

Bounds of Analysis – **Spatial:** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation

Existing Conditions – Site-specific inventories for federally listed, Regional Forester sensitive, and locally rare plants were conducted by Tom Govus, botanical contractor, in June - August 2005. No federally listed or Sensitive plants were found during these inventories. However several locally rare species were observed including the purple giant-hyssop (*Agastache scrophularifolium*), Manhart's sedge (*Carex manhartii*), Rough Sedge (*Carex scabrata*), Naked fruit rush (*Juncus gymnocarpus*), and horse gentian (*Triosteum aurantiacum*). In addition, non-native invasive species (NNIS) were recorded during these inventories. NNIS observed included of Japanese stiltgrass (*Microstegium vimineum*), Chinese privet (*Ligustrum sinense*), and Tree-of-heaven (*Ailanthus altissima*).

Effects to federally-listed threatened and endangered species as well as Regional Forester Sensitive Species are analyzed in detail in the Biological Evaluation for this project. The results are summarized here. These species are those for which there is concern for viability of their populations across their range. Based on this analysis, 3 Sensitive

Species occur or potentially occur in the vicinity of the project. In addition, 6 other species of local viability concern are also addressed here because they occur or potentially occur in the vicinity of the project. This was determined by: (1) consulting 17 years of Forest Service plant inventory records, (2) consulting Georgia Natural Heritage Program (GNHP) records, (3) consulting University of Georgia (UGA), Forest Service, and Georgia Department of Natural Resources (GADNR) aquatic inventory records, (4) reviewing U.S. Fish and Wildlife Service county lists for potential species in Fannin County, (5) ongoing discussions with GNHP, Forest Service, and other agency biologists, (6) various scientific references such as technical manuals, herbarium records, NatureServe information, and others, and (7) results from project-level surveys.

Table 25 Terrestrial Viability Concern Species known to occur or with potential to occur in the Brawley Mountain project vicinity.

Scientific Name	Common Name	Status
<i>Corynorhinus rafinesquii</i>	Rafineque's Big-eared Bat	S
<i>Speyeria diana</i>	Diana Fritillary Butterfly	S
<i>Agastache scrophularifolium</i>	Purple Giant-Hyssop	LR
<i>Carex manhartii</i>	Manhart's Sedge	LR
<i>Carex scabrata</i>	Rough Sedge	LR
<i>Juncus gymnocarpus</i>	Naked Fruit Rush	LR
<i>Triosteum aurantiacum</i>	Horse Gentian	LR
<i>Condylura cristata</i>	Star-nosed Mole	LR
<i>Pituophis m. melanoleucus</i>	Northern Pine Snake	LR

Rafinesque's big-eared bat - There are historic records for Rafinesque's big-eared bat from Fannin and Union Counties, the most recent of which is a 1963 record from an old gold mine near Dial (GNHP database). Laerm (1981) reported historic records from Fannin, Union, Towns, and Rabun Counties in northern Georgia and several counties in the Coastal Plain, but indicated that this species was reconfirmed from only one locality on the coast (Floyd's Island) in extensive surveys throughout the state. More recently, Menzel et al. (1998) reported Rafineque's big-eared bat from old mines in Fort Mountain State Park in Murray County, Georgia.

In the summer of 2001 and 2002, Dr. Susan Loeb from Clemson University conducted bat mist netting across the Chattahoochee National Forest including several sites on the Blue Ridge Ranger District. Dr. Loeb also mist netted areas near known records of the Rafinesque's big-eared bat. The only Rafinesque's big-eared bat collected during this sampling was from eastern Rabun County near the South Carolina State line. No big-eared bats were found during any of the mist netting on the Blue Ridge Ranger District.

The Rafinesque's big-eared bat hibernates primarily in caves and old buildings, usually near permanent water (Webster et al. 1985). Harvey (1992) states that maternity colonies are primarily found in old buildings, and are rarely found in caves and mines. There are no caves, mines, or old buildings present in the project area and therefore it does not provide hibernation or maternity habitat.

In the summer, male big-eared bats may roost in hollow trees (Harvey, 1992). Hollow trees are common throughout the Forest and are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these older Forests on the Chattahoochee-Oconee National Forest. The Brawley Mountain project area does provide roosting habitat for the bat.

Diana fritillary - The Diana fritillary occurs throughout the Southern Appalachians, inhabiting pine and deciduous forests near streams. Violets serve as the host plant for larvae (Scott 1986). Opler (1992) states that males may use a variety of habitats, but primary habitat consists of openings and fields in wet, rich woods. Roads and other openings in moist woods provide nectar plants for this butterfly (Broadwell 1993). Many of the nectar plants are associated with early successional habitats or forest edges. There are historic reports of this species in White, Union, Fannin, Habersham, and Rabun Counties (Harris 1972). It has been observed in a variety of habitats throughout the Forest for the past 15 years (C. Wentworth, pers. comm.). Breeding habitats are primarily mesic, deciduous or mixed forests where numerous violets occur in the understory (NatureServe 2007). Because the butterfly uses a variety of forest types including both pine and hardwood forests of varying successional stages, nearly the entire Forest (750,000 acres), including the stands in the project area provide suitable habitat.

Purple giant hyssop – This species occurs in rich woodlands and forests from Vermont west to Minnesota, south to North Carolina, eastern Tennessee, northern Georgia, and eastern Kansas (Weakley 2007). In Georgia, there are historic records from Rabun, Union, and Murray Counties (Jones and Coile 1988) and has recently been found in the Cohutta Mountains (T. Govus pers. comm.). It is on the Special Concern Plant Species List in Georgia. Three populations of this species were found along the road and powerline near the summit of Brawley Mountain during the recent inventories.

Manhart's sedge – This sedge is endemic to the Blue Ridge Mountains in western North Carolina, southwestern Virginia, northeast Georgia, and southeast Tennessee (Weakley 2007). It is found in cove forests and montane oak-hickory forests, mostly at medium to fairly high elevations. Once considered very rare, this species is now known to be locally common in portions of southwest North Carolina and adjacent northeast Georgia (Weakley 2007). Over 40 populations have been found the Chattahoochee National Forest in the past 10-15 years. This species was observed in 4 stands in the Brawley Mountain project area in the recent inventories.

Rough sedge – The rough sedge is considered secure across its range which extends from Canada, down through New England, into the southeast. The primary threat to conservation of the plant is wetland drainage (NatureServe 2007). One small population of this locally rare sedge, located in a stream channel, was found in the recent inventories of the project area.

Naked-fruit rush – This rush occurs in bogs, seeps and streams in the mountains of northeastern Georgia, eastern Tennessee, western North Carolina, northwestern South

Carolina, eastern Pennsylvania, and the Coastal Plain of southeastern Alabama, southern Mississippi, and north central panhandle Florida (Weakley 2007). It is apparently secure throughout its range, but is locally rare in Georgia (NatureServe 2007). One population of this rush was found in one of the small stream in the project area.

Horse gentian - Horse gentian is found in woodlands and forests in circumneutral soils, particularly over mafic or calcareous rocks (Weakley 2007). The number of known populations of this species are limited although approximately 12 populations have been found during recent inventories on the Blue Ridge Ranger District. A small population of 8 individuals was found on the edge of a perennial stream during the recent plant inventories.

Star-nosed mole - The star-nosed mole is associated with moist swampy habitats such as marshes, bogs, seeps, and streams in both forested and early successional communities. Burrows near wet habitats may open directly into the water. Nests are constructed in burrows above water level (Webster et al. 1985, Laerm 1995). There are no records of this species in the vicinity of the Brawley Mountain project area, but it could be found in association with the seeps and small streams in the area.

Northern pine snake - The northern pine snake is known from Banks, Burke, Dawson, Lumpkin, Paulding, Pickens, and White Counties (Hermann and Fahey, pers. comm.). Additional counties with records of the snake's occurrence are Cherokee, Cobb, Gilmer, Gwinnett and Rabun (Williamson and Moulis 1994). The northern pine snake is found in dry, upland forests such as those found on the Brawley Mountain project area. This secretive species requires dry, often sandy soil for construction of their burrows, where they spend much of their time underground (Mount 1975, Martof et al. 1980, Wilson 1995). Eggs are laid in nests located in cavities or burrows that are several inches below ground (Mount 1975). The pine snake's diet consists primarily of small mammals (Martof et al. 1980).

Non-Native Invasive Species (NNIS)

Japanese stiltgrass is an annual that reproduces by seed. These seeds are spread primarily by floodwaters, but also by animals, humans, and contaminated soil, and possibly by wind for short distances. It spreads quickly in sites with natural or human-mediated soil disturbance, and seeds can remain viable in the soil for 3 to 5 years (NatureServe 2007). The primary habitat for stiltgrass is ditches, floodplains and wetlands, forest and stream edges, as well as shaded roads and trails (Evans et al. 2006). Japanese still grass was found throughout the Brawley Mountain project area, generally associated with roadsides, fire lines and other areas of previous soil disturbance.

Chinese privet is an aggressive invasive, often forming dense thickets, particularly in bottomland forests and along fencerows, spreading to adjacent forests, fields and rights-of-way (Miller 2003). It is shade tolerant, and is spread widely by abundant bird and other animal-dispersed seeds. A few widely scattered plants were observed in 2 stands in the Brawley Mountain project area.

Tree-of-Heaven is a rapidly growing tree, often forming thickets and dense stands (Miller 2003). It is both shade and flood intolerant and allelopathic. It colonizes by root sprouts and spreads by prolific wind- and water-dispersed seeds. This species was observed in 1 stand in the Brawley Mountain project area during the recent plant inventories.

Effects of Alternative 1 (No Action):

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to viability concern species are expected. Through time, the amount of mid-late successional habitat will increase as the forests in the area mature. This should result in increased availability of hollow roost trees for Rafinesque's big-eared bat. Habitat conditions for other viability concern species should remain constant. Similarly, there would be no change in conditions that would favor the spread of most NNIS species. However, shade tolerant NNIS species like privet could spread under the no-action alternative.

Cumulative Effects - There are no additional actions planned in the vicinity of the Brawley Mountain road that would adversely affect viability concern species. Surveys have been and continue to be conducted in portions of the Forest to determine presence and distribution of various small mammals, birds, amphibians and reptiles, aquatic species, and PETS and Locally Rare plants. The Georgia National Heritage Program (GNHP) records are checked for known occurrences of PETS and Locally Rare species in project areas, and close contact is maintained between the GNHP biologists and Forest Service biologists for sharing of new information. Forest Service records and other agencies' biologists and records (in addition to GNHP) are consulted for occurrences.

Future management activities and project locations will be analyzed utilizing any new information available on viability concern species. For Sensitive and Locally Rare species, mitigating measures will be implemented where needed to maintain habitat for these species on the Forest and to prevent future listing under the Endangered Species Act.

Effects of Alternative 2 (Proposed Action):

Direct and Indirect Effects

Rafinesque's Big-eared Bat - There are no known records of the Rafinesque's big-eared bat in the Brawley Mountain project area and hibernation and maternity habitat is not present in the project area. Hollow trees that serve as summer roosts for male bats are common throughout the Forest and are associated with older forests, typically greater than 60 years of age. There are approximately 680,000 acres of these older Forests on the Chattahoochee-Oconee National Forest and approximately 900 acres in the Brawley Mountain analysis area. The revised Forest plan contains a standard that provides for protection of existing snags and den trees during vegetation management treatments. As a result, hollow trees will not be cut or intentionally disturbed. Even if a hollow tree is

inadvertently damaged, roosting bats are quick to fly away when disturbed on the roost (Ozier 1999), and will promptly relocate (M. Bunch SCDNR, pers. comm. with A. Gaston).

Although the proposed prescribed burning could damage some hollow trees, given their abundance on the Forest, the availability of summer roost trees will not be affected. Through time, repeated prescribed burns will result in fire scarring of the residual trees that will lead to the development of additional hollow trees, offsetting any losses of existing potential roosts. Since no hibernation habitat is present, big-eared bats are not likely to be present on these sites during the dormant season when the controlled burn will occur.

Details of the herbicide risk assessment are summarized in Appendix B. Bats could be exposed to herbicides via dermal, ingestion, or inhalation routes. The hazard quotient (HQ) for small mammals with typical exposures through direct spray, and consumption of contaminated vegetation, water, and insects all are less than 1.0 for glyphosate, triclopyr amine, triclopyr ester, and imazapyr, indicating exposure levels not of concern.

According to the VMEIS Volume II (USFS 1989), the herbicides analyzed, including the 4 considered here, were rapidly eliminated from the systems of animals studied. In addition, the animals showed low tissue retention of the herbicides. For these reasons, glyphosate, imazapyr, and triclopyr present a very low risk of bioaccumulation.

Diana Fritillary - There would be no direct effect of the proposed thinning on the Diana Fritillary. The proposed thinning could impact larval host plants (violets) and nectar plants on the site. However nectar plants are not a limiting factor for the Diana, and flowering plants that would provide nectar for the butterfly are commonly found in all types of habitat throughout the Chattahoochee Forest, as well as on private land. In addition, many of the nectar plants likely would increase in these areas due to increased sunlight and would offset any impacts to existing plants.

If Diana's were present in the area, they would be present only in the larval (caterpillar) stage at the time of year the prescribed burn would occur. At the end of summer, Diana fritillary eggs are laid next to dried-up violets where they hatch in the fall. The young caterpillars overwinter in the duff without feeding until spring, when they begin feeding on the adjacent violets (Opler 1992). Diana larvae overwinter deep in the duff, and are unlikely to be impacted by dormant season prescribed burns (Adams, pers. comm. with C. Wentworth). The fuel conditions would result in a mosaic pattern of burned area (i.e. portions of the area would not be burned). Therefore, this dormant season burn, which remove only the upper litter layers, should not impact this species. In addition, existing skid trails and roads will be used for much of the control lines so new ground disturbance will be minimal. Prescribed burning during the dormant season would not harm any larval and nectar plants since the above ground portions would not be present, and the dormant season burn would not damage the root systems. Moreover, observations by Campbell et al. (2007) suggest that disturbances like prescribed burning and mechanical

treatments should increase the amount and diversity of nectar resources available to Diana fritillaries.

According to the VMEIS (vol. II, page 6-9 and 6-15), glyphosate, imazapyr and triclopyr are all relatively nontoxic to insects. Hazard quotients for direct spray of insects (honey bee) are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure. During herbicide activities, the Diana fritillary butterfly would likely relocate and would not be present on a cut stump, stems or leaves being directly sprayed by herbicide. Herbicide application also could impact nectar plants and violets necessary for the life cycle of Diana fritillary. However, as discussed above, mitigation measure will be implemented to minimize impacts to non-target plants.

The spread of NNIS, particularly Japanese siltgrass could indirectly affect the Diana Fritillary through competition with nectar and larval host plants. The mesic sites and riparian areas of the project area provide the greatest opportunity for spread of siltgrass. However, the majority of the ground disturbance activities will occur in on the ridgetops and upper slopes and disturbance in the mesic portions of the project area will be limited. This should reduce the potential impacts of siltgrass on native vegetation, including nectar and larval host plants of Diana Fritillary. In addition, there is some indication that late season prescribed burning map help control the spread of siltgrass (Evans et al. 2006).

Locally Rare Plants - Populations of five locally rare plants, purple giant-hyssop, Manhart's sedge, naked fruit-rush, rough sedge and horse gentian were found during botanical inventories of the Brawley Mountain Project Area.

Three populations of purple giant-hyssop were found in areas of previous disturbance along the road and powerline near the summit of Brawley Mountain. These populations will be protected from direct impacts by prohibiting logging, logging equipment, tree felling, and herbicide application within the colony sites. This species is often associated with open areas such as roadside thickets and requires disturbance for seed germination and for populations to persist (Corrigan 2002). The proposed thinning, prescribed burning, and selective herbicide use, particularly on the ridgetop sites likely will improve habitat conditions for this species, by providing open canopy conditions and controlling competing wood vegetation.

Manhart's sedge was found in 5 stands with populations ranging from a few individuals to 1000 or more. These populations were generally located on mesic sites with north or east aspects where the degree of disturbance will be moderate. The larger populations of Manhart's sedge will be protected by prohibiting logging, logging equipment, tree felling, and herbicide application within the colony sites and surrounding buffer area sufficiently large to maintain existing light conditions. Several of the small scattered populations may be impacted by the proposed activities. However given the large number and size of known populations on the Forest, this will not impact this species viability on the Forest. Prescribed burning will occur during the dormant season and will not negatively impact these plants.

The populations of naked-fruit rush, rough sedge are located in stream channels and the small population of horse gentian is located on the edge of a stream. Proposed activities in these areas are limited and these populations will be protected through the application of riparian corridor standards (MRx 11) and Best Management Practices. Prescribed burning will occur during the dormant season and burning intensity will be low in the riparian areas. Therefore there will be no negative impacts to these plants from prescribed burning.

The herbicide application proposed in this alternative could impact these locally rare plants. However, direct to these plants are not likely due to the fact herbicide will be applied to specific targeted plants either by application to the cut stump or direct foliar application. Forest Plan Standard FW- 019 prohibits the application of herbicide within 60 feet of any federally listed or sensitive species except to protect them from invasive plant competition. In addition, a project level mitigation measure has been included that provides this same 60 foot buffer distance for locally rare plants. Other Forest Plan standards also prevent impacts to non-target vegetation, such as weather restrictions to prevent drift of herbicide found in standard FW-13, and nozzle size restrictions found in FW-14. In addition, Imazapyr, the only herbicide proposed that has some degree of soil activity (only in the spring); will only be applied from late June to mid September when the chemical has little or no evidence of soil mobility. This will further protect non-targeted vegetation, including rare plants, from any direct impacts.

The spread of NNIS have the potential to impact these locally rare plants as well as other native plants. However, most of the NNIS are located in different stands and/or habitats than are the locally rare plants. In addition, the proposed prescribed burning and herbicide treatments will control some of the NNIS populations.

The woody NNIS, tree-of-heaven and Chinese privet, will be treated during the post-sale herbicide application. There currently are just a few scattered individuals of these species present in the project area that should be effectively controlled with herbicides. Repeated prescribed burns as is proposed for this project also have been shown to be effective in controlling privet (Evans et al. 2006). These actions will diminish the potential impact of these species on native plants.

Japanese stiltgrass is the most widely distributed NNIS in the project area and as a result, has the greatest potential to impact the existing locally rare plants. The primary habitat for stiltgrass is ditches, floodplains and wetlands, forest and stream edges, as well as shaded roads and trails (Evans et al. 2006). The majority of the locally rare plants are associated with mesic habitats which could provide suitable habitat for the spread of stiltgrass. However, ground disturbing activities will be limited in the mesic areas which will reduce the potential for spread of stiltgrass into these areas. In addition, the mitigation measures described above such as excluding, logging equipment and tree felling near the locally rare plants will further limit the degree of disturbance near these local rare species. The populations of rough sedge and naked-fruit rush were found rooted in the water, and although stiltgrass is tolerant of saturated soil, it will not

establish in permanent water (Evans et al. 2006, NatureServe 2007). In addition, late season prescribed burning as is proposed in this alternative may help control the spread of stiltgrass (Evans et al 2006).

Star-nosed Mole - There are no records of the star-nosed mole in the vicinity of Brawley Mountain. The project area does not contain any marsh or bog habitat, but this species could be found in association with the small streams in the area. These sites will be protected through the application of riparian corridor standards (MRx 11) and Best Management Practices (BMPs). As a result there will be no impacts to potential habitat for the star-nosed mole.

If present, star-nosed moles could be exposed to herbicides via dermal, ingestion, or inhalation routes. The hazard quotient (HQ) for small mammals with typical exposures through direct spray, and consumption of contaminated vegetation, water, and insects all are less than 1.0 for all herbicide applications proposed in this alternative indicating exposure levels not of concern. In addition, with the provision of riparian buffer strips on stream zones, the risk of herbicide contamination in streams is greatly reduced

Northern Pine Snake - The northern pine snake is found in dry, upland forests such as those found on the Brawley Mountain project area. However there are no records of this species from Fannin County or the Brawley Mountain project area. This species spend much of their time underground. Therefore, the proposed thinning and dormant season prescribed burning activities would have no direct impacts on this snake, which, if present, would likely retreat to its burrow. The treatments proposed (thinning, burning, herbicide application) will result in the opening of the canopy and increase in herbaceous vegetation. This would likely increase habitat for the small rodents serving as prey for the pine snake.

Below-ground contamination and dermal absorption of herbicide by the pine snake would be unlikely due to the fact that glyphosate is not mobile in the soil and triclopyr has limited soil mobility. Imazapyr, which has some soil mobility in the spring, will be applied from late June through mid September when there is little to no evidence of soil mobility. The pine snake's diet consists primarily of small mammals (Martof et al. 1980). Reptiles were not evaluated in the herbicide risk assessment but hazard quotients for carnivorous mammals consuming contaminated small mammals also are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure.

Cumulative Effects — There are no additional actions planned in the vicinity of the Brawley Mountain road that would adversely affect viability concern species. The only recent vegetation management activities on Forest Service lands in this area have been prescribed burning. There has been no herbicide use in the project vicinity in the last 10 years.

Surveys have been and continue to be conducted in portions of the Forest to determine presence and distribution of various small mammals, birds, amphibians and reptiles, aquatic species, and PETS and Locally Rare plants. The Georgia National Heritage Program (GNHP) records are checked for known occurrences of PETS and Locally Rare species in project areas, and close contact is maintained between the GNHP biologists and Forest Service biologists for sharing of new information. Forest Service records and other agencies' biologists and records (in addition to GNHP) are consulted for occurrences.

Future management activities and project locations will be analyzed utilizing any new information available on viability concern species. For Sensitive and Locally Rare species, mitigating measures will be implemented where needed to maintain habitat for these species on the Forest and to prevent future listing under the Endangered Species Act.

The cumulative effects of NNIS will be reduced on this all other vegetation management projects on the Forest through the inclusion of special provisions included in timber sale contracts. Clause BT6.35 Equipment Cleaning directs the Forest service to identify areas with invasive species of concern on the Sale Area Map. In addition, it provides specific requirements for cleaning equipment when moving from areas infested with invasive species of concern to uninfested areas as well as direction regarding equipment inspection. These provisions should help minimize the spread of NNIS.

Effects of Alternative 3:

Direct and Indirect Effects – The direct effects of this alternative on rare terrestrial species would be similar to Alternative 2. The acres of timber harvest will be less than Alternative 2 and will be restricted to the ridgetops and upper and mid slope positions. Activities in the areas containing the populations of rough sedge, naked-fruit rush, horse gentian, and the majority of the Manhart's sedge would be limited to dormant season prescribed burning which will have no impact on these species. Because no ground disturbing activities will occur in these mesic sites, the potential for spread of NNIS to the areas containing rare plants will be limited. The other significant populations of Manhart's sedge and of giant purple hyssop will be protected from direct impacts by prohibiting logging, logging equipment, tree felling, and herbicide application within the colony sites. As in Alternative 2, the existing populations of privet and tree of heaven will be treated during the post-sale herbicide application. Repeated prescribed burns of the area also should limit the spread of many of the NNIS.

Cumulative Effects: The cumulative effects this alternative on rare terrestrial species would be similar to Alternative 2.

Effects of Alternative 4:

Direct and Indirect Effects - In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. As with Alternative 3, all canopy thinning will be restricted to the upper and mid slope positions. Activities in the areas containing the populations of rough sedge, naked-fruit rush, horse gentian, and the majority of the Manhart's sedge would be limited to dormant season prescribed burning which will have no impact on these species. Because no ground disturbing activities will occur in these mesic sites, the potential for spread of NNIS to the areas containing rare plants will be limited. The other significant populations of Manhart's sedge and of giant purple hyssop will be protected from direct impacts by prohibiting logging, logging equipment, and tree felling within the colony sites. In this alternative the existing populations of privet and tree of heaven will not be treated with an herbicide application. However, some limited control of these and other NNIS may be achieved through the repeated prescribed burns proposed for the area.

Cumulative Effects: The cumulative effects this alternative on rare terrestrial species would be similar to Alternative 2.

ELEMENT – Golden-winged Warbler

Measure: Affects on habitat conditions and populations of Golden-Winged Warblers

Bounds of Analysis: **Spatial-** The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal** – Approximately 10 years following implementation

Existing Conditions:

Breeding Bird Survey data record an annual decline of -18.7% for golden-winged warblers from 1966-1979 in Georgia ($p = 0.64$). Since 1979 Golden-winged Warblers are rare enough on the landscape that no birds have been detected. Golden-winged warblers were not detected on any degree block surveys for the Georgia Breeding Bird Atlas and were not encountered during any Georgia North American Migration Counts. Golden-winged Warblers were listed as Endangered in Georgia in 2006.

USFS and GA DNR personnel conducted extensive surveys for Golden-winged Warblers from 1999-2003 in North Georgia. At that time five small populations were found, most consisting of just one pair or single males. Since that time only one population remains, that on Brawley Mountain. This population, which consisted of about 3 territorial pairs in 2003 has grown to about 12-15 pairs since then as a result of several prescribed fires and one wildfire. Hybrids with Blue-winged Warblers, which may present a problem to the conservation of Golden-winged Warblers were found in 2002 but have not been confirmed since the implementation of the prescribed fire program. Golden-winged

Warblers are only found on Brawley Mountain where severe storm damage and subsequent logging from hurricane Opal resulted in an open canopy, with residual basal areas ranging from zero to about 20 sq. ft/acre. The remainder of the mountain has an unbroken canopy, primarily of oak/hickory forests, which does not constitute suitable habitat for this species.

In the Southern Appalachians, optimal habitat for golden-winged warblers occurs between 2800 and 3800 feet elevation (Klaus and Buehler 2001) however suitable habitat at lower elevations also is utilized. The existing golden-winged warbler habitat on Brawley Mountain is located at approximately 2600-2700 feet elevation, well within the elevation ranges where Golden-winged Warblers have been detected in Georgia (Klaus 2004). Furthermore Golden-winged Warblers have become so uncommon in Georgia that habitat management is most likely to succeed near to an existing population, such as at Brawley Mountain.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - The absence of active management for this species will result in continued canopy closure and unsuitable habitat for Golden-winged Warblers throughout most of the project area. At this time this habitat appears to be saturated and may only be capable of supporting 10-20 pairs of golden-winged warblers which does not constitute a viable population. This means that this population is likely to go extinct in the next 100 years unless it is augmented.

Cumulative Effects – With no action, the limited quantity of suitable habitat will decline over time as forest regrowth and canopy closure occurs. Barring an intense natural disturbance, golden-winged warblers may eventually be excerpted from Brawley Mountain. Georgia was once home to a sizeable population of golden-winged warblers. Extirpation of Golden-winged Warblers on Brawley Mountain may represent the end of this species' occurrence in Georgia and may end any opportunity to effect conservation of this endangered species in Georgia.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects- Thinning would open canopy cover allowing sprouts and herbaceous cover to dominate between scattered trees. This cover would provide additional nesting and foraging habitat for golden-winged warblers along ridgelines where thinning is heaviest as well as patchy nesting habitat along mid slopes. Mid and lower slopes would retain a greater degree of residual canopy cover but would still provide some nesting habitat as well as extensive foraging and fledging habitat for Golden-winged Warblers where the understory was dense.

Herbicide work to reduce woody sprouts would increase the extent of herbaceous nesting cover and help perpetuate the open character. This would have the direct effect of extending the window of suitable nesting habitat as well as the indirect effect of allowing

enough herbaceous cover to become established so that future burns would maintain suitable habitat indefinitely.

Regular prescribed fire would help maintain herbaceous nesting cover by reducing competing hardwood sprouts and preparing a seed bed for herbaceous plants. Prescribed fires conducted during the dormant season as well as early spring (prior to mid-April) would not have any direct effect on Golden-winged Warblers. Fire would reduce hardwood sprouts and increase herbaceous cover, which would benefit this species.

Planting native grasses would facilitate establishing nesting habitat for this species. Most Golden-winged Warbler nests are placed on the ground in areas of thick herbaceous cover such as native grasses.

Cumulative Effects – Small increases in available habitat from prescribed fires have quickly resulted in a small population increase of Golden-winged Warblers on Brawley Mountain. By providing additional habitat for this species it is likely that we will further increase Golden-winged Warbler populations, bringing their population closer to a viable level and providing a source population that could colonize any additional habitat in the area. While exact estimations of population are difficult to ascertain, it is likely that this alternative would provide 595 acres of habitat on the mid and upper slopes. Open ridgetop habitats will likely be of greater quality and support more pairs than more densely forested mid-slopes, however these treatments may increase populations to 40-60 breeding pairs. This will five fold increase in population would bring us much closer to the estimated 1,000 breeding pairs necessary to maintain a viable population over the next 100 years.

Effects of Alternative 3

Direct and Indirect Effects- Effects of canopy opening, prescribed fire, herbicide, and supplemental seeding would be similar as in Alternative 2. Reduction of the extent of activities would result in less foraging habitat available for birds nesting on the upper slopes. This could result in lower fecundity for these individuals. In addition there would be a 2-fold reduction in the amount of nesting habitat available for Golden-winged Warblers. There would also be a decrease in the available habitat with a dense understory. This habitat is critical to fledgling Golden-winged Warblers in the weeks after they leave the nest to protect them from predation. Loss of this habitat may reduce fledgling survival.

Cumulative Effects - This treatment will provide approximately 395 acres of Golden-winged Warbler habitat on the upper and mid slopes, increasing Golden-winged Warbler populations to 26-40 breeding pairs. This three fold increase would substantially increase the local population but would leave the Chattahoochee National Forest far short of a sustainable population. Additional sites on the Chattahoochee National Forest close to Brawley Mountain would need to be identified and new woodland projects initiated to ensure this species' viability.

Effects of Alternative 4

Direct and Indirect Effects- The direct effects of the alternative would be similar to Alternative 3. However there would be less herbaceous cover and what remained would be slower to establish. This would further decrease the available nesting habitat for Golden-winged Warblers and may make the habitat more transient, providing habitat for 5-10 years but eventually some of the project area would grow back into forest that would not provide habitat for Golden-winged Warblers.

Cumulative Effects - Golden-winged Warbler would show an increase as herbaceous and understory density increased, but much of it may fade with time if insufficient fuels are established to control hardwood sprouting. This would ultimately result in declines of Golden-winged Warblers as forests recovered and would decrease the long-term viability of Golden-winged Warblers in Georgia.

DEMAND SPECIES

White-tailed deer and black bears were selected as Forest Plan MIS to represent public demand issues and are relevant to this project. Due to public interest related to this project, effects of the project on ruffed grouse also will be evaluated.

Element - White-tailed Deer

Measure - Effects on habitat conditions and deer populations from project activities.

Bounds of Analysis – The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation.

Existing Conditions

White-tailed deer was selected as a MIS to help indicate the effects of management in meeting public demand as a hunted species. Deer require a mixture of forest/successional stage habitats to meet their year-round habitat needs. Key requirements include the interspersions of mature mast producing stands during fall and winter, early successional forest to provide browse and soft mast, and high quality permanent openings. Current deer populations are moderate on the Brawley Mountain Project area due to limited availability of early successional habitat and high quality permanent openings.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects- This alternative will perpetuate current conditions and no direct impacts to white-tailed deer are expected. Through time, the limited amount of

available early successional habitat in the Brawley project area will decline as the forests in the area mature. This should result in a reduction of the availability of deer forages and habitat conditions for deer.

Cumulative Effects - Early successional habitat and high quality permanent openings important for deer are limited on the Brawley Mountain area. These habitats are somewhat more common on the Forest as a whole. Deer harvest data collected by Georgia DNR personnel indicates that deer populations in the mountains and ridge and valley are stable to increasing with some fluctuations primarily due to differences in the annual mast crops (USDA Forest Service 2005). Implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit white-tailed deer populations on the Forest (USDA Forest Service 2004a). However, no additional activities affecting deer habitat are planned for the Brawley Mountain area. Therefore no cumulative effects to white-tailed deer or their habitat are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – A number of the treatments proposed under this alternative will result in improved habitat conditions for deer. The canopy openings resulting from the proposed canopy removal will increase the production of browse and soft mast in these stands. Similarly, prescribed burning also will stimulate the production of new growth of both herbaceous and woody species. The greatest response in browse and forage production will be on the mid and upper slopes where the most substantial canopy opening is proposed. However, the more moderate thinning on the lower slopes also will provide increased browse and forage production. Forages produced on these more mesic sites will likely be of higher quality than of those from more xeric sites.

There will be some reduction in the availability of oak mast with the implementation of this alternative. Much of the upper slopes and ridgetop areas where the most substantial canopy removal will occur currently are mature upland oak stands and to a lesser extent, white pine-dominated stands. As the post-sale high canopy cover on these ridge top sites would be approximately 20 percent, the quantity of mature mast producing trees on these ridgetop sites will decrease. However, because the trees to be retained on these sites will primarily be fire-tolerant species such as blackjack oak and southern red oak, some limited mast producing capability will be maintained. While oak mast capability will decline in these stands, in the analysis area the availability of acorns for deer and other mast consuming species will remain high. Mature mast producing stands comprise over half of the analysis area and these ridgetop and upper slope stands represent only a fraction of the available habitat. The degree of canopy removal will be more moderate on the mid and lower slope positions. Although some mature mast producing oaks will be cut and removed from these sites, the expansion of the crowns of the remaining trees will largely offset any reduction in oak mast production. Through time, the amount of mid-late successional oak forests in the analysis area will increase as the forests in the area mature. This should result in increased hard mast production in the area, which will benefit deer and other mast-dependent species.

Details of the herbicide risk assessment are summarized in Appendix B. Hazard quotients for typical long term exposures to contaminated vegetation were greater than 1.0 for large mammals and large birds only for triclopyr (amine) cut surface application. These hazard quotients are not of significant concern because with cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small. In addition, the scenario assumes a diet composed of 100% contaminated vegetation from the site. The diets of large mammals such as deer are highly variable and include hard and soft mast as well as green vegetation. Large mammals also typically have fairly large home ranges. The scenario also assumes that such vegetation will be consumed from the same sites for 90 consecutive days. The rate at which treated vegetation becomes unappetizing and then unavailable to foraging mammals following treatment make the assumptions proposed for this scenario quite unrealistically conservative for the project area.

Cumulative Effects – Across the Forest, implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit white-tailed deer populations on the Forest (USDA Forest Service 2004a). The thinning and prescribed burning in this alternative will enhance deer habitat on the Brawley project area. No additional activities affecting deer habitat are planned for the Brawley Mountain area. Therefore no cumulative effects to white-tailed deer or their habitat are expected.

Effects of Alternative 3

Direct and Indirect Effects – As in Alternative 2, the canopy removal and prescribed burning proposed under this alternative will result in improved habitat conditions for deer. However, the acres of timber harvest will be less than Alternative 2 and will be restricted to the ridgetops and upper and mid slope positions. Therefore the benefits to deer in terms of both quantity and quality of browse and soft mast will be less than in Alternative 2. The availability of oak mast also will decline in this alternative although to a lesser degree than Alternative 2 because of the reduced treatment acres. However the availability of acorns for deer and other mast consuming species in the analysis area will remain high.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2.

Effects of Alternative 4

Direct and Indirect Effects – In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. This will result in a more limited availability of herbaceous forages and a greater quantity of woody browse on these sites. As with Alternative 3, all canopy thinning will be

restricted to the upper and mid slope positions. The direct effects of this alternative on white-tailed deer would be similar to Alternative 2.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2.

Element - Black Bear

Measure - Effects on habitat conditions and black bear populations from project activities.

Bounds of Analysis – The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation

Existing Conditions

This species was selected as a MIS to help indicate the effects of management in meeting public demand as a hunted species. In the Southern Appalachians, important habitat elements for black bears are habitat diversity, den site availability, availability of hard mast, and habitat remoteness (USDA Forest Service 2004a)

Early successional forest habitat is extremely limited in the project area and as result, soft mast is uncommon. However, mature mast-producing stands are abundant in the Brawley Mountain project area. In addition, over half of the project area is in late successional conditions (greater than 80 years-of-age) and as a result, large den trees are common. Current bear populations are moderate in the project area.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to black bear are expected. Through time, the limited amount of available early successional forest habitat in the Brawley Mountain project area will decline as the forests in the area mature. This should result in a further reduction of the availability of soft mast important to bears and many other species. However, the amount of mature upland hardwood forests will increase as the Forest matures resulting in increases in hard mast and den tree availability.

Cumulative Effects - Black bear numbers have increased and are beginning to stabilize after 20 years of growth, according to bait station survey results (USDA Forest Service 2006). Based on harvest records and bear and human encounters, state biologists have concluded that bears are nearing carrying capacity on the Chattahoochee NF. Increased acres of older hardwood stands, sustained hard mast production, and enhanced soft mast production through forest management activities—such as prescribed burning and timber harvest—have contributed to improved black bear habitat on the Forest.

Mature hard mast producing stands that are important to bears are common on the Brawley Mountain project area as well as the Forest as a whole. However, early successional forest that are important sources of soft mast are much more limited across the Forest. Implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit black bear populations on the Forest (USDA Forest Service 2004a).

No additional activities affecting bear habitats are planned the project area. Therefore no cumulative effects to black bear or their habitat are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects – A number of the treatments proposed under this alternative will result in improved habitat conditions for bears. The canopy openings resulting from the proposed canopy removal will increase the production of soft mast and herbaceous forages in these stands. Similarly, prescribed burning also will stimulate the production of new growth of both herbaceous and woody species. The greatest response in soft mast forage production will be on the mid and upper slopes where the most substantial canopy opening is proposed. However, the more moderate thinning on the lower slopes also will provide increased soft mast and forage production. Forages produced on these more mesic sites will likely be of higher quality than of those from more xeric sites.

There will be some reduction in the availability of oak mast with the implementation of this alternative. Much of the upper slopes and ridgetop areas where the most substantial canopy removal will occur currently are mature upland oak stands and to a lesser extent, white pine-dominated stands. As the post-sale high canopy cover on these ridge top sites would be approximately 20 percent, the quantity of mature mast producing trees on these ridgetop sites will decrease. However, because the trees to be retained on these sites will primarily be fire-tolerant species such as blackjack oak and southern red oak, some limited mast producing capability will be maintained. While oak mast capability will decline in these stands, in the analysis area the availability of acorns for deer and other mast consuming species will remain high. Mature mast producing stands comprise over half of the analysis area and these ridgetop and upper slope stands represent only a fraction of the available habitat. The degree of canopy removal will be more moderate on the mid and lower slope positions. Although some mature mast producing oaks will be cut and removed from these sites, the expansion of the crowns of the remaining trees will largely offset any reduction in oak mast production. Through time, the amount of mid-late successional oak forests in the analysis area will increase as the forests in the area mature. This should result in increased hard mast production in the area, which will benefit bears and other mast-dependent species.

Existing den sites and potential black bear den trees in the project area will be protected (Forest-wide standards FW-009, FW-010). While there may be some declines in the availability of large trees for future dens on the ridgetop and upper slope sites due to the

substantial removal of overstory trees on these sites, the trees retained on these sites will be the largest, and most fire-tolerant. These may develop into hollow den trees in the future as a result of repeated prescribed fires. Over half the analysis area is over 80 years of age, and therefore potential den trees will remain common across the area.

Details of the herbicide risk assessment are summarized in Appendix B. Hazard quotients for typical long term exposures to contaminated vegetation were greater than 1.0 for large mammals and large birds only for triclopyr (amine) cut surface application. These hazard quotients are not of significant concern because with cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small. In addition, the scenario assumes a diet composed of 100% contaminated vegetation from the site. The diets of large mammals such as bears are highly variable and include hard and soft mast as well as green vegetation. Large mammals also typically have fairly large home ranges. The scenario also assumes that such vegetation will be consumed from the same sites for 90 consecutive days. The rate at which treated vegetation becomes unappetizing and then unavailable to foraging mammals following treatment make the assumptions proposed for this scenario quite unrealistically conservative for the project area.

Cumulative Effects – Black bear numbers have increased and are beginning to stabilize after 20 years of growth, according to bait station survey results (USDA Forest Service 2006). Based on harvest records and bear and human encounters, state biologists have concluded that bears are nearing carrying capacity on the Chattahoochee NF. Increased acres of older hardwood stands, sustained hard mast production, and enhanced soft mast production through forest management activities—such as prescribed burning and timber harvest—have contributed to improved black bear habitat on the Forest.

Mature hard mast producing stands that are important to bears are common on the Brawley Mountain project area as well as the Forest as a whole. However, early successional forest that are important sources of soft mast are much more limited across the Forest. Implementation of the revised Forest Plan is expected to provide a diversity of habitats that will benefit black bear populations on the Forest (USDA Forest Service 2004a).

No additional activities affecting bear habitats are planned the project area. Therefore no cumulative effects to black bear or their habitat are expected.

Effects of Alternative 3

Direct and Indirect Effects – As in Alternative 2, the canopy removal and prescribed burning proposed under this alternative will result in improved habitat conditions for black bears. However, the acres of timber harvest will be less than Alternative 2 and will be restricted to the ridgetops and upper and mid slope positions. Therefore the benefits to bears in terms of both quantity and quality of herbaceous forages and soft mast will be less than in Alternative 2. The availability of oak mast also will decline in

this alternative although to a lesser degree than Alternative 2 because of the reduced treatment acres. However the availability of acorns for bears and other mast consuming species in the analysis area will remain high. Similarly potential den trees may decline on the ridgetop sites but will remain common in the analysis area.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2.

Effects of Alternative 4

Direct and Indirect Effects –In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. This will result a more limited availability of herbaceous forages and a greater quantity of woody species on these sites. As with Alternative 3, all canopy thinning will be restricted to the upper and mid slope positions. The direct effects of this alternative on black bear would be similar to Alternative 2.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2.

Element – Ruffed Grouse

Measure - Effects on habitat conditions and ruffed grouse populations from project activities.

Bounds of Analysis – The spatial bound of the analysis area is all of the stands that are partially within the treatment acres of the proposed action. There are 28 stands summing to approximately 1,137 acres. **Temporal:** Approximately 10 years following implementation

Existing Conditions

Although ruffed grouse use a variety of forest habitat and successional stages, population responses are most strongly tied to the availability of early successional habitat, particularly hardwood shrub-seedling habitat (Dimmick et al., 1996, Wiggers et al. 1992). The dense structure of these young regenerating stands (3-15 years old) provides both brood and adult cover by offering protection from both avian and mammalian predators (Thompson and Dessecker 1997). Another key feature of brood habitat is an abundance of insects which provide a high protein food source. Insects are most abundant in habitats containing lush herbaceous groundcover (Dimmick et al, 1996). Current grouse populations in the Brawley Mountain area likely are low due to limited availability of early successional habitats and area well developed herbaceous ground cover. Only 1 percent of the analysis area (12 acres) is in stands less than 15 years of age.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects - This alternative will perpetuate current conditions and no direct impacts to ruffed grouse are expected. Through time, the limited amount of available early successional forest habitat in the Brawley Mountain project area will decline as the forests in the area mature. This should result in a further reduction in habitat availability for ruffed grouse and other early successional species.

Cumulative Effects

Ruffed grouse populations on the Chattahoochee National Forest have declined over the last two decades (USDA Forest Service 2000, Gregory 2007). Much of this decline can be attributed to the reduction in availability of hardwood shrub-seedling habitats as a result in decreased timber harvest levels. Comparable declines in ruffed grouse populations have been documented from throughout the eastern United States (Dessecker and McAuley 2001). Implementation of the revised Forest Plan is expected to increase the levels of early-successional forest habitat which will benefit ruffed grouse and other early successional species (USDA Forest Service 2004a). However, the majority of the forest will be in mid and late successional conditions which will limit the availability of quality grouse habitat.

No additional activities affecting ruffed grouse habitats are planned the project area. Therefore no cumulative effects to ruffed grouse or their habitat are expected.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects - The treatments proposed under this alternative include timber harvest, prescribed burning, and herbicide application. The effects of this alternative on ruffed grouse will vary across the treatment area, depending on the degree of canopy reduction. The timber harvest treatments proposed for the ridgetop and upper slopes would result in a substantial opening of the overstory canopy on approximately 200 acres. Residual canopy cover on these sites will be approximately 20%. The subsequent prescribed burning and herbicide application proposed for these sites will result in a reduction in the woody understory and an increase in herbaceous cover. The well developed herbaceous cover on these ridgetop sites would provide suitable brood rearing habitat, but because of the open conditions, woody cover would be limited.

The treatments proposed for the mid-slopes sites (approximately 395 acres) will provide the greatest benefit to ruffed grouse by increasing the availability of brood and adult cover. On these sites, a range of 20-60 percent canopy cover would be maintained after treatment. As a result, much of these mid-slope sites will develop a relative dense understory. This well developed shrub habitat will be maintained through periodic prescribed burning.

On the lower slopes of the project area (approximately 140 acres) the degree of canopy opening will be more limited. The increased sunlight will result in increased soft mast

and herbaceous and woody cover on these sites, although the response will be less than on the mid and upper slopes. However, herbaceous foods produced on these more mesic sites will likely be of higher quality than of those from more xeric sites.

Details of the herbicide risk assessment are summarized in Appendix B. Hazard quotients for small birds consuming contaminated insects are well below 1.0 for all herbicide applications proposed in this alternative indicating low risk, even at upper levels of exposure. Hazard quotients for typical long term exposures to contaminated vegetation were greater than 1.0 for large mammals and large birds only for triclopyr (amine) cut surface application. These hazard quotients are not of significant concern because with cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small. In addition, the scenario assumes a diet composed of 100% contaminated vegetation from the site. The diets of ruffed grouse are highly variable and include insects, hard and soft mast as well as green vegetation. The scenario also assumes that such vegetation will be consumed from the same sites for 90 consecutive days. The rate at which treated vegetation becomes unappetizing and then unavailable to foraging animals following treatment make the assumptions proposed for this scenario quite unrealistically conservative for the project area.

Cumulative Effects

Implementation of the revised Forest Plan is expected to increase the levels of early-successional forest habitat which will benefit ruffed grouse and other early successional species (USDA Forest Service 2004a). However, the majority of the forest will be in mid and late successional conditions which will limit the availability of quality grouse habitat. The thinning and prescribed burning in this alternative will enhance grouse habitat on the Brawley project area. No additional activities affecting ruffed grouse habitats are planned the project area. Therefore no cumulative effects to ruffed grouse or their habitat are expected.

Effects of Alternative 3

Direct and Indirect Effects – As in Alternative 2, the canopy removal and prescribed burning proposed under this alternative will result in improved habitat conditions for ruffed grouse. However, the acres of timber harvest will be less than Alternative 2 and will be restricted to the ridgetops and upper and mid slope positions. The treatments proposed for the midslope sites will provide the greatest benefits to grouse by creating a well developed woody understory. However, the acreage of these mid-slope sites to be thinned is approximately half of that proposed in Alternative 2. In addition, no thinning will occur in the more mesic lower slopes. Therefore the benefits to grouse in terms of both quantity and quality of cover, herbaceous forages and soft mast will be less than in Alternative 2.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2.

Effects of Alternative 4

Direct and Indirect Effects –In this alternative, the acres of timber harvest and sequence of activities are the same as Alternative 3 except that no herbicides will be used. Instead, more frequent prescribed burning will be used to maintain woodland conditions. This will result a more limited availability of herbaceous cover and a greater quantity of woody cover on these sites. As with Alternative 3, all canopy thinning will be restricted to the upper and mid slope positions. The direct effects of this alternative on ruffed grouse would be similar to Alternative 2.

Cumulative Effects – The cumulative effects of this alternative will be similar to Alternative 2.

SOCIAL EFFECTS

Element: Recreation

This section will address the effects of the various alternatives on motorized and non-motorized recreation use in the project area.

Measure: Use by hikers, hunters, anglers, and dispersed campers.

Bounds of Analysis:

Spatial: The approximately 750 acres of the project area and portions of the Benton MacKaye Trail between Wilscot Gap and Brawley Mountain.

Temporal: The recreational use of the project area over the next ten years.

Existing Conditions:

The management prescription for the project area is 7E.1-Dispersed Recreation. The Brawley Mountain project area recreation use primarily consists of hiking on the Benton MacKaye Trail, a segment of which runs generally along the northern boundary of the project area, large and small game hunting, and some dispersed camping along FS 45 (Brawley Mountain Road) and FS 35 (Weeks Creek Road). No developed recreation opportunities exist in the project area. Some illegal OHV use takes place via user-created trails. Other outdoor-related recreation uses are minimal.

Effects of Alternative 1 (No Action)

Direct Effects: If no action is taken, recreational opportunities and use patterns will remain essentially the same.

Indirect Effects: Same as Direct Effects.

Cumulative Effects: Same as Direct Effects.

Effects of Alternative 2 (Proposed Action)

Direct Effects: Effects on recreational activities in the project area will be primarily during the period the work is taking place. The timber harvesting, saw-down, prescribed fire, and selective herbicide treatment components of this alternative will have little or no effect on hiking opportunities on the Benton MacKaye Trail. Some noise impacts along segments of the trail could occur during timber harvesting and saw-down treatments. Smoke impacts along segments of the trail could occur during the prescribed burning component. Both these impacts can be mitigated by the posting of informational signs at trail crossings leading to the project area prior to the project taking place. Potential trail maintenance problems associated with increased sunlight leading to more herbaceous vegetation growth along the trail corridor, as well as burned snag hazard trees can be mitigated by conducting the project activities no closer than 100 feet of the trail. The selective herbicide application component should have no effect on trail users. Some hunting activity and associated dispersed camping might be limited during the period the project work is being performed.

Indirect Effects: Reducing stem density will have the potential of increasing illegal OHV use in this area, along with the opening of haul and skid routes. Open understory is traditionally inviting to off-trail OHV use. This will be mitigated by pulling slash into all haul and skid routes within line-of-sight of the Benton MacKaye Trail and Forest Roads 45 and 35, not to exceed 200 feet, well-constructed tank traps, signing, and compliance checks. An increase in soft mast and browse as the area is changed in character might offer long term increases in hunting opportunities.

Cumulative Effects: The actions proposed in this alternative will not significantly change the type or volume of the recreation activities in the surrounding area or the district as a whole.

Effects of Alternative 3

Direct Effects: Essentially the same as those in Alternative 2.

Indirect Effects: Essentially the same as those in Alternative 2.

Cumulative Effects: Essentially the same as those in Alternative 2.

Effects of Alternative 4

Direct Effects: Essentially the same as those in Alternative 2.

Indirect Effects: Essentially the same as those in Alternative 2.

Cumulative Effects: Essentially the same as those in Alternative 2.

Element: Public Health and Safety

The following issues of public health and safety will be addressed: the use and application of herbicides, the use of prescribe fire, and timber harvesting safety.

Measure: Measure will consist of the types of herbicide to be used, the application rates and the number of acres to be treated, prescribed burning procedures, and timber harvesting operations.

Bounds of Analysis: **Spatial:** Public health and safety issues will be analyzed for the Brawley Mountain area and adjacent private lands. **Temporal:** Public health and safety issues related to project activities that will occur for the next ten years.

Existing Conditions:

The primary recreational uses in the Brawley Mountain area is hiking on the Benton MacKaye Trail and hunting during the spring turkey season and fall and winter deer, bear, and small games seasons. Streams on the area all are small headwaters stream that do not provide recreational fishing opportunities. There also are limited dispersed camping opportunities along FS 45 (Brawley Mountain Road) and FS 35 (Weeks Creek Road). There are no known public health and safety issues specific to the analysis area.

Effects of Alternative 1 (No Action)

Direct and Indirect Effects: If no action is taken conditions will remain the same as now. There would be no direct effects on safety regarding timber harvest, herbicide use or prescribed burning since none of these activities would occur.

Cumulative Effects: There will be no cumulative effects on public safety from the no action alternative.

Effects of Alternative 2 (Proposed Action)

Direct and Indirect Effects - Effects of all herbicides have been assessed in the Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains (VMEIS). For all herbicides considered, an additional risk analysis was completed using methodology developed for the Forest Service by Syracuse Environmental Research Associates (SERA – Version 4.04). The details of the risk assessment results are available in the project record. In the risk assessments, there are

two terms not used in the VMEIS. These are Reference Dose (RfD) and Hazard Quotient (HQ).

- **RfD** - Derived by USEPA, this is the maximum dose in mg of herbicide active ingredient per kg of body weight per day that is not expected to cause injury over a lifetime of exposure. In other words, it is, in EPA's opinion, a "safe" lifetime daily dose. This is a conservative estimate, and is designed to be protective.
- **HQ** - This is the ratio of the estimated exposure dose to the RfD. A HQ of 1 reflects an exposure to amounts of a.i. equal to the RfD; HQs less than 1 reflect exposures to amounts of a.i. less than the RfD, while HQs greater than 1 reflect exposures to amounts of a.i. greater than the RfD. *HQs of 1.0 or less reflect exposure levels that are not of concern.* HQs greater than 1.0 reflect exposures to possible effects to be examined more closely to see if the projected exposures need to be further mitigated or need to be avoided. For the effects on wildlife, one must remember that these effects are constructed for individuals and not populations.

For Alternatives 2 and 3, the spill plan in Appendix C would be in place. Alternatives 2 and 3 also assume that all of the mitigation measures in Chapter 2 and Appendix A of this document would be followed, as would mitigation measures in the VMEIS. Published analyses of environmental effects in the VMEIS are not duplicated in this document. However, information published subsequent to the VMEIS encountered in the open literature that is both relevant to this analysis and demonstrates a potential for significant effect on the conclusions drawn in the VMEIS has been included in the current analysis.

The risk analysis is based on the standard application rates in the SERA Version 4.04 Worksheets. In some cases (as noted below), the proposed application rates for this project are lower than the standard application rates. Since results of the risk analysis with lower application rates would be the same or less as using the standard application rates, new scenarios for lower application rates were not run for this analysis. The following tables show the basis for the estimated application rates that are will be used on this project.

Herbicide Application Rate Assumptions

Cut (severed) stems and streamline applications

Herbicide	Lbs ai/gal	% (fraction) in solution	Gallons of spray/acre	Lbs ai/acre
Glyphosate	5.4	50.0%	0.65	1.8 ¹
Triclopyr (amine)	3.0	50.0%	2.5	3.75
Triclopyr (ester)	4.0	20%	1.0	0.8 ²

1. ¹ See results for glyphosate at 2.0 lbs/ac

2. ² See results for triclopyr ester at 1.4 lbs/ac

Foliar Spray Applications

Herbicide	Lbs ai/gal	% (fraction) in solution	Gallons of spray/acre	Lbs ai/acre
Triclopyr (ester)	4.0	2.0%	15	1.4
Imazapyr	2.0	0.39%	15	0.1 ³

³ See results for imazapyr at 0.45 lbs/ac

For each herbicide, hazard quotients are developed that summarize risk characteristics for workers, the general public, terrestrial animals and aquatic species. For this analysis, hazard quotients derived from spill scenarios into ponds have been set to zero. The reason is that the project has mitigation measures in place (Appendix A) that make such spills so unlikely that such an analysis would be irrelevant. In addition, in the unlikely event this should occur, expedited clean up and exclusion from use are required until clean up has been accomplished. The specific spill scenario referenced is: acute/accidental exposure, contaminated water consumed by a child (EO4 sheet).

Hazard quotients for the general public involving direct spray exposures to the entire body or lower legs are also considered so unlikely as to be irrelevant. These have also been set to zero.

Following is a summary of the findings from this assessment for values over 1.0. A complete summary of results of the risk assessment is in Appendix B of this document.

The most important hazard quotient is the general exposure HQ for workers. These are the people most likely to have direct exposure to herbicides. According to the Forest Service Southern Region Pesticide Specialist, the central HQ best reflects a realistic upper exposure and risk for workers using required personal protective equipment and employing proper washing and hygiene habits. Rapid personal cleanup in the event of any exposure should keep the dosage internalized (the hazard) in the typical, rather than the upper bound range.

Results of the risk assessment for typical exposures of glyphosate at 2.0 lbs/acre are well under 1.0 (see project file) indicating low risk. For imazapyr, none of the hazard quotients calculated for risks to workers or the general public were above 1.0.

For both the amine and ester formulation of triclopyr, results of the risk assessment found that typical exposures of workers to directed ground spray (backpack) were 1.0 or less. Although *upper* exposures were calculated above 1.0 for general exposure of workers using a backpack and for a spill on the lower legs to a worker (triclopyr amine), the central HQ best reflects a realistic upper exposure and risk for workers using appropriate personal protective equipment and employing proper washing and hygiene habits according to the Forest Service Southern Region Pesticide Specialist.

Accidental exposure of a worker to contaminated gloves shows a typical HQ of 1.1 triclopyr (ester formulation) at 1.4 lbs/acre. This is unlikely to occur because the scenario assumes that the contaminated glove will be left on the hands in direct contact with the skin for 1 hour. Labeling instructions and worker protection standards require proper hygiene. Contaminated gloves should be removed immediately and both the contaminated skin and gloves should be washed with an appropriate soap or detergent, and water.

The use of protective clothing can substantially reduce worker doses. Protective clothing can reduce worker exposures by 27 to 99 percent, as shown in a number of field studies

of worker exposure (VMEIS, Volume II, Appendix A, page 5-35). Workers would be required to wear all personal protective and safety equipment required by labeling. A change of clothes as well as soap, wash water, eyewash bottles and first aid equipment would also be provided on-site.

While workers are more likely to be exposed to the herbicide than the general public, the risk to workers (systemic and reproductive) from ground based spraying application of these herbicides at typical rates is low (VMEIS, Volume 1, Chapter IV, page IV-18).

For both the amine and ester formulation of triclopyr, typical hazard quotients for consumption of vegetation by an adult female are above 1.0 for both acute and chronic exposures. However, consumption of contaminated vegetation is unlikely for the following reasons:

- Herbicide application areas are signed to preclude accidental exposure.
- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.
-

In addition, the long term scenario assumes that for a long term exposure to occur contaminated or vegetation eaten 90 days in a row.

For both the amine and ester formulation of triclopyr, typical hazard quotients for vegetation contact of an adult female in shorts and a t-shirt are above 1.0. However, this scenario is unlikely since herbicide application areas are signed to preclude accidental exposure.

As a result of these analyses, and given that Forest Plan Standards, project mitigation, and assumptions are met, there should be no significant negative effect to human health or safety as a result of herbicide use in this alternative.

One potential danger of prescribed fire would be the escape onto private property. All standard mitigations for prescribed fire operations would be followed to prevent this from happening. All personnel involved in the actual firing operations will be fully trained and equipped with all the required personal protective equipment. Prescribed burning produces some particulate emissions which impair visibility and can have an adverse impact on human health. Particulate matter emission would be greatly reduced by burning under conditions that enhance flaming and reduce smoldering. Burning when atmospheric conditions are most conducive to smoke dispersion would lessen the effects of particulate matter on smoke-sensitive areas.

There would be a risk of injury to forest workers engaged in tree falling, limbing, and bucking from the use of chainsaws and from falling trees or limbs. There would be risk of injury to forest workers and equipment operators from log skidding and loading operations. These risks would be reduced by the use of personal protective equipment normally used during logging and other forest work activities, such as hardhats, gloves,

work boots, chainsaw chaps, and eye and ear protection. There would be a risk for vehicular accidents on the roads resulting from log truck traffic hauling products off the national forest. Appropriate posting of warning signs at the national forest gates would be mandated by the Forest Service if the proposal is implemented.

Cumulative Effects: The potential effects to health and safety would be similar in type and extent from those associated with previous projects across the district and would not be significant.

The use of herbicides carries some risks to human health and safety, particularly to the applicator. This risk is reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing the risk of herbicide use to human health and safety is the low level of active ingredient per acre and placement of notice signs posted in areas where herbicide has been applied. The signs include information on the herbicide used, when it was applied, and who to contact for additional information (see also Appendix A, Standard Mitigation Measures for Herbicide Use).

All standards in the current Forest Plan which relate to herbicide use will be met. An Emergency Spill Plan that outlines procedures to be followed in the event of an accidental spill is included in Appendix C. The Emergency Spill Plan also contains information on providing care to persons who are exposed to a spill.

In cut surface treatment, herbicide is applied directly to a freshly cut stump in an amount that will not run off. The herbicide is rapidly absorbed into the stump and is dry within an hour of treatment. When applied at the required typical rate, these herbicides pose an insignificant risk (systemic and reproductive) to the public either from dietary exposure (water, fish, meat, vegetable, foraged berry) or dermal exposure (on-site or drift) (VMEIS, Volume 1, IV-16). To mitigate any possible contact with the public, dye is added to the herbicide and warning signs are placed in all treatment areas.

Cumulative effects that might result from the use of herbicides on private land are difficult to assess. The use of herbicides on private land is generally for the control of woody plants near homes. No other herbicide use is currently proposed within the project area or anticipated to occur within the near future. The treatments are also proposed for implementation over a 3 –5 year period of time. For these reasons and because the effects to human health and safety are likely to be small, Alternative 2 will result in few or no cumulative impacts to human health and safety.

Effects of Alternative 3

Direct and Indirect Effects – The effects of this alternative on public health and safety will be similar to Alternative 2. As in Alternative 2, this alternative involves the use of herbicides, timber harvest, chainsaw felling, and prescribed burning. Except for timber harvest, the acreage of each of these treatments will be similar to Alternative 2. In this Alternative, timber harvest will be restricted to the ridgetops and upper and mid slope

positions and will involve slightly more than half of the acres in Alternative 2, reducing the risk to forest workers from timber harvest operations. Risks to forest worker from timber harvest operations will be mitigated through the use of personal protective equipment normally used during logging and other forest work activities.

Cumulative Effects – The cumulative effects of this alternative would be similar to Alternative 3.

Effects of Alternative 4

Direct and Indirect Effects - In this Alternative, herbicides would not be used to control stump sprout clumps to create habitat niches for the herbaceous species. The potential risk to public health and safety from the use of herbicides would be eliminated. However, this alternative will require more frequent prescribed burning in order to maintain woodland conditions. More frequent burning could result in a slight increase risk to prescribed burning personnel and the public from the smoke produced from these additional burns. However, particulate matter emission would be greatly reduced by burning under conditions that enhance flaming and reduce smoldering. Burning when atmospheric conditions are most conducive to smoke dispersion would lessen the effects of particulate matter on smoke-sensitive areas.

Cumulative Effects – The cumulative effects of this alternative would be similar to Alternative 3.

OTHER CONSIDERATIONS

Consumers, Civil Rights, Minority Groups, and Women

Consumers or users of the project area would be affected as detailed in the physical, biological, economic and social effects analysis. The timber harvesting, saw-down, prescribed fire, and selective herbicide treatment components of this project will have little or no effect on hiking opportunities on the Benton MacKaye Trail. Hunters as users should see increases in game populations including wild turkey and white-tailed deer, as well as songbirds and small mammals. Some hunting activity and associated dispersed camping might be limited during the period the project work is being performed.

Sightseers would see a short-term increase in contrast the harvest operations for approximately three to five years. Wildflowers, green sprouts from most species of trees and shrubs, and other forbs and vines would grow vigorously with the increase in sunlight created by the harvesting.

The civil rights of individuals or groups, including women, would not be affected under the proposed action or any of the alternatives. There are no actions or methods of actions that would affect any one group or individual any differently than others.

APPENDICES

APPENDIX A. STANDARD MITIGATION MEASURES FOR HERBICIDE USE

1. Herbicides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.
2. Only herbicide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service for use on national forests are applied.
3. Public safety during such uses as viewing, hiking, berry picking, and fuelwood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment.
4. Areas are not prescribed burned for at least 30 days after herbicide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the herbicide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. Triclopyr is not ground-applied within 60 feet, of known occupied gray bat habitat. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. No herbicide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them. Selective applications to control competing vegetation within this buffer designated to protect TES plants may occur when needed to protect the TES plants from encroachment by invasive plants and when a non-soil active herbicide is used.
11. Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.

12. No herbicide is ground-applied within 100 horizontal feet, of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so that applicators can easily see and avoid them.
13. Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas
14. During use, equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.
15. Herbicides and application methods are chosen to minimize risk to human and wildlife health and the environment. No class B, C, or D chemical may be used on any project, except with Regional Forester approval. Approval will be granted only if a site-specific analysis shows that no other treatment would be effective and that all adverse health and environmental effects will be fully mitigated. Diesel oil will not be used as a carrier for herbicides, except as it may be a component of a formulated product when purchased from the manufacturer. Vegetable oils will be used as the carrier for herbicides when available and compatible with the application proposed.
16. Herbicides are applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human (NRC 1983) and wildlife health (EPA 1986a). Application rate and work time must not exceed levels that pose an unacceptable level of risk to human or wildlife health. If the rate or exposure time being evaluated causes the Margin of Safety (MOS) or the Hazard Quotient (HQ) computed for a proposed treatment to fail to achieve the current Forest Service R-8 standard for acceptability (acceptability requires a MOS > 100 or a HQ of < 1.0 using the most current of the SERA or Risk Assessments found on the Forest Service website). Additional risk management must be undertaken to reduce unacceptable risks to acceptable levels, or an alternative method of treatment must be used.
17. Weather is monitored and the project suspended if temperature, humidity, or wind becomes unfavorable for correct application as shown in Table 1.

Table 1. Weather Restrictions for Herbicide Application

Application Method	Temperatures Higher Than	Humidity Less Than	Wind (at target) Greater Than
Ground:			
Hand (cut surface)	N.A.	N.A.	N.A.
Hand (other)	98°F	20%	15 mph
Mechanical:			
Liquid	95°F	30%	10 mph
Granular	N.A.	N.A.	10 mph
Aerial:			
Liquid	90°F	50%	5 mph
Granular	N.A.	N.A.	8 mph

18. Nozzles that produce large droplets (mean droplet size of 50 microns or larger) or streams of herbicide are used. Nozzles that produce fine droplets are used only for hand treatment where distance from nozzle to target does not exceed 8 feet.
19. Pesticide mixing, loading, or cleaning areas in the field are located at least 50 feet from ephemeral streams.
20. No-soil active herbicide with half-life longer than three months is broadcast within 25 feet of ephemeral streams. Selective treatments with aquatic-labeled herbicides are allowed. Such areas are clearly marked before treatment so that applicators can easily see and avoid them.
21. No herbicide is broadcast within 100 feet of private land or 300 feet of a private residence, unless the landowner agrees to closer treatment. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
22. **Project-level Mitigation** - No herbicide is ground-applied within 60 feet of any known locally rare plant (Purple Giant Hyssop, Manhart's Sedge, Rough Sedge, Naked Fruit-Rush, Horse Gentian). Buffers are clearly marked before treatment so applicators can easily see and avoid them. Selective applications to control competing vegetation within this buffer designated to protect locally rare plants may occur when needed to protect the locally rare plants from encroachment by invasive plants and when a non-soil active herbicide is used.

APPENDIX B. RESULTS OF THE RISK ASSESSMENT – DETAILED SUMMARY

Effects of all herbicides have been assessed in the Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains (VMEIS). For all herbicides considered, an additional risk analysis was completed using methodology developed for the Forest Service by Syracuse Environmental Research Associates (SERA – Version 4.04). The details of the risk assessment results are available in the project record. In the risk assessments, there are two terms not used in the VMEIS. These are Reference Dose (RfD) and Hazard Quotient (HQ).

- **RfD** - Derived by USEPA, this is the maximum dose in mg of herbicide active ingredient per kg of body weight per day that is not expected to cause injury over a lifetime of exposure. In other words, it is, in EPA's opinion, a "safe" lifetime daily dose. This is a conservative estimate, and is designed to be protective.
- **HQ** - This is the ratio of the estimated exposure dose to the RfD. A HQ of 1 reflects an exposure to amounts of a.i. equal to the RfD; HQs less than 1 reflect exposures to amounts of a.i. less than the RfD, while HQs greater than 1 reflect exposures to amounts of a.i. greater than the RfD. *HQs of 1.0 or less reflect exposure levels that are not of concern.* HQs greater than 1.0 reflect exposures to possible effects to be examined more closely to see if the projected exposures need to be further mitigated or need to be avoided. For the effects on wildlife, one must remember that these effects are constructed for individuals and not populations.

For Alternatives 2 and 3, the spill plan in Appendix C would be in place. Alternatives 2 and 3 also assume that all of the mitigation measures in Chapter 2 and Appendix A of this document would be followed, as would mitigation measures in the VMEIS. Published analyses of environmental effects in the VMEIS are not duplicated in this document. However, information published subsequent to the VMEIS encountered in the open literature that is both relevant to this analysis and demonstrates a potential for significant effect on the conclusions drawn in the VMEIS has been included in the current analysis.

The risk analysis is based on the standard application rates in the SERA Version 4.04 Worksheets. In some cases (as noted below), the proposed application rates for this project are lower than the standard application rates. Since results of the risk analysis with lower application rates would be the same or less as using the standard application rates, new scenarios for lower application rates were not run for this analysis. The following tables show the basis for the estimated application rates that are will be used on this project.

Herbicide Application Rate Assumptions

Cut (severed) stems and streamline applications

Herbicide	Lbs ai/gal	% (fraction) in solution	Gallons of spray/acre	Lbs ai/acre
Glyphosate	5.4	50.0%	0.65	1.8 ¹
Triclopyr (amine)	3.0	50.0%	2.5	3.75
Triclopyr (ester)	4.0	20%	1.0	0.8 ²

3. ¹See results for glyphosate at 2.0 lbs/ac

4. ²See results for triclopyr ester at 1.4 lbs/ac

Foliar Spray Applications

Herbicide	Lbs ai/gal	% (fraction) in solution	Gallons of spray/acre	Lbs ai/acre
Triclopyr (ester)	4.0	2.0%	15	1.4
Imazapyr	2.0	0.39%	15	0.1 ³

³ See results for imazapyr at 0.45 lbs/ac

For each herbicide, hazard quotients are developed that summarize risk characteristics for workers, the general public, terrestrial animals and aquatic species. For this analysis, hazard quotients derived from spill scenarios into ponds have been set to zero. The reason is that the project has mitigation measures in place (Appendix A) that make such spills so unlikely that such an analysis would be irrelevant. In addition, in the unlikely event this should occur, expedited clean up and exclusion from use are required until clean up has been accomplished. The specific spill scenario referenced is: acute/accidental exposure, contaminated water consumed by a child (EO4 sheet).

Hazard quotients for the general public involving direct spray exposures to the entire body or lower legs are also considered so unlikely as to be irrelevant. These have also been set to zero.

The most important hazard quotient is the general exposure HQ for workers. These are the people most likely to have direct exposure to herbicides. According to the Forest Service Southern Region Pesticide Specialist, the central HQ best reflects a realistic upper exposure and risk for workers using required personal protective equipment and employing proper washing and hygiene habits.

The herbicides considered for use in this EA are glyphosate, triclopyr, and imazapyr. Hazard quotients were calculated for the estimated application rates for this project. HQ's over 1.0 are discussed below.

Glyphosate, injection or cut stump treatment @ 2.0 lbs/acre

Glyphosate was analyzed under two situations, with and without the use of a surfactant. Because the use of a surfactant (most commonly a detergent) would slightly increase any toxicity, those results are reported here.

Results for typical exposures of glyphosate are all less than 1.0 for human health (Sheet E04). The *upper* bound HQ is 1.4 for consumption of contaminated vegetation by an adult female. However, the upper bound exposure is most unlikely for the following reasons:

- Herbicide application areas are signed to preclude accidental exposure.

- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.

Wildlife G03 sheet, acute exposure hazard quotients to fish, aquatic invertebrates and aquatic macrophytes for accidental spills have calculated values over 1.0. Such exposures and risk are most unlikely for glyphosate. This is because glyphosate is strongly adsorbed to (bound to the surface of) both organic matter and clay particles. Therefore it is very immobile in the environment, and unlikely to reach aquatic habitat. Even in the unlikely event that it might reach such habitat, it would probably be quickly bound to sediment or organic matter in the stream. In addition, with the provision of riparian buffer strips on stream zones, the risk is further reduced. This includes a standard that prohibits herbicide application within 100 horizontal feet of lakes, wetlands, or perennial or intermittent springs and seeps (FW standard FW-022). All herbicide application in the Brawley Mountain project will be confined to the mid-upper slopes and ridgetop sites, well away from any streams. No herbicide application will occur within the riparian corridor.

Triclopyr (amine), cut surface application @ 3.75 lbs/acre

Human health E02 sheet, directed ground spray (backpack), general exposure for workers, *upper* bound HQ = 6.0, *upper* bound for spill on hands is 1.7 and *upper* bound for spill on lower legs is 4.0. Typical exposures are 1.0 or less. The upper bound exposure is most unlikely for the following reason:

- According to the Forest Service Southern Region Pesticide Specialist, the central HQ best reflects a realistic upper exposure and risk for workers using appropriate personal protective equipment and employing proper washing and hygiene habits. Forest Service personnel are required to follow these safety protocols whenever applying pesticides. Rapid personal cleanup in the event of any exposure should keep the dosage internalized (the hazard) in the typical, rather than the upper bound range.

Human health E04 sheet, the typical HQ for vegetation contact of an adult female in shorts and a t-shirt is 3.0 and the lower level is 1.0. However, this scenario is unlikely since herbicide application areas are signed to preclude accidental exposure and with cut surface or injection application, the probability of exposure is low.

For acute exposure, the *upper* bound HQ for consumption of fruit by an adult female is 3.0. Typical exposures are less than 1.0 at a value of 0.2. The typical HQ for consumption of vegetation by an adult female is 12.0 and the lower level is 3.0. However, consumption of contaminated fruit and vegetation is unlikely for the following reasons:

- Herbicide application areas are signed to preclude accidental exposure.
- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.

Long term exposure for women, contaminated fruit, *upper* bound HQ = 1.7. Typical exposures are less than 1.0 at a value of 0.1. The typical HQ for long term consumption of vegetation by an adult female is 6.0 and the lower level is 1.0. The upper bound exposures are most unlikely for the following reasons:

- Herbicide application areas are signed to preclude accidental exposure.
- The scenario assumes that for a long term exposure to occur contaminated fruit or vegetation eaten 90 days in a row.
- Blackberries, the only types of fruit likely to be available in any substantial quantity, would not continue to ripen for more than approximately one week after treatment. After that time, they would be unavailable to berry foragers.
- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.

Wildlife G02 sheet, long term consumption of contaminated vegetation by a large mammal and large bird, shows typical HQs of 1.9 and 1.5, respectively. These hazard quotients are not of significant concern because:

- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.
- The scenario assumes a diet composed of 100% contaminated vegetation from the site. The diets of large mammal and birds such as deer and turkey are highly variable and include hard and soft mast (deer and turkeys), insects and seed (turkey) as well as green vegetation. Large mammals and large birds also typically have fairly large home ranges. The scenario also assumes that such vegetation will be consumed from the same sites for 90 consecutive days. The rate at which treated vegetation becomes unappetizing and then unavailable to foraging mammals and birds following treatment make the assumptions proposed for this scenario quite unrealistically conservative for the project area.

Although there are upper level values above 1.0 for small mammals eating a contaminated insect and large mammals eating grass, the typical values are all less than 1.0. Typical values represent the most likely situation.

In addition to the effects described above, direct effects to birds or mammals are unlikely since these species are likely to move from the area when project activities are implemented. Although direct effects to amphibians are more likely since contact with herbicide could be absorbed through the skin and effect metabolic activity, amphibians are likely to be under logs, rocks or leaves, making direct contact with chemicals less likely. Direct effects to other non-target plants occurring in these habitats could occur.

Application methods, including direct application to target foliage or freshly cut stumps, would minimize the possibility for spills and/or direct contamination to non-target species.

Wildlife G03 sheet, the *upper* exposure HQ's for fish and aquatic invertebrates for accidental spills exceed 1.0 but typical exposure HQ's are less than or equal to 1.0. The typical exposure HQ for aquatic plants and algae are greater than 1.0 for accidental spills. These are not of concern because:

- With the provision of riparian buffer strips around streams, the risk of herbicide spills or movement into streams is further reduced.
- Mixing and dilution in active streams will minimize any potential hazard from any small spills which might occur during implementation of this project.
- All herbicide application in the Brawley Mountain project will be confined to the mid-upper slopes and ridgetop sites, well away from any streams. No herbicide application will occur within the riparian corridor.

Hazard quotients for exposure of terrestrial vegetation from runoff of triclopyr amine (Sheet G04) have hazard quotients greater than 1.0 in areas with more than 25 inches of rainfall per year. These values vary depending on the average annual rainfall in a given area and the scenarios assume that rain falls every 10 days. The typical value for an area with 50 inches of annual rainfall is 1.4. However, all proposed herbicide applications are to be applied directly to the targeted vegetation; therefore by correctly following application procedures, impacts to non-targeted species would be minimal. Although some loss of terrestrial plants could possibly occur, there are mitigation measures already in place to protect sensitive species so overall effects should be minimal.

Triclopyr (ester), foliar application @ 1.4 lbs/acre

This will be applied in a mix containing 3oz triclopyr ester and 0.5 oz imazapyr and is applied lightly over the top to just speckle the vegetation. This mixture uses less active ingredient per acre than a formulation containing only triclopyr.

Human health E02 sheet, directed ground spray (backpack), general exposure for workers, *upper* bound HQ = 2.0. Typical exposures are less than 1.0 at a value of 0.4. The upper bound exposure is most unlikely for the following reason:

- According to the Forest Service Southern Region Pesticide Specialist, the central HQ best reflects a realistic upper exposure and risk for workers using appropriate personal protective equipment and employing proper washing and hygiene habits. Forest Service personnel are required to follow these safety protocols whenever applying pesticides.

Human health E02 sheet, accidental exposure of a worker to contaminated gloves shows a typical HQ of 1.1. This is unlikely to occur because the scenario assumes that the contaminated glove will be left on the hands in direct contact with the skin for 1 hour. Labeling instructions and worker protection standards require proper hygiene. Contaminated gloves should be removed immediately and both the contaminated skin and gloves should be washed with an appropriate soap or detergent, and water.

The typical HQ for vegetation contact of an adult female in shorts and a t-shirt is 1.9 and the lower level is less than 1.0 (Sheet E04). However, this scenario is unlikely since herbicide application areas are signed to preclude accidental exposure and the scenario assumes contact occurs while the vegetation is still wet.

The typical HQ for consumption of vegetation by an adult female is 5.0 and the lower level is 0.9. However, consumption of vegetation is unlikely for the following reasons:

- Herbicide application areas are signed to preclude accidental exposure.
- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.

The typical HQ for long term consumption of vegetation by an adult female is 2.0 and the lower level is 0.4. These hazard quotients are not of significant concern because:

- Herbicide application areas are signed to preclude accidental exposure.
- The scenario assumes that for a long term exposure to occur contaminated vegetation eaten 90 days in a row.
- With cut surface or injection application, the amount of non-target vegetation subject to spray deposition is very small.

Wildlife G02 sheet, longer term exposure (90 days) of a large bird or large mammal to contaminated vegetation on site, had *upper* level HQ's above 1.0. Typical values were less than 1.0. The upper level hazard quotient is not a concern for the following reason:

- The scenarios assume a diet composed of 100% contaminated vegetation from the site. The diets of large mammal and birds such as deer and turkey are highly variable and include hard and soft mast (deer and turkeys), insects and seed (turkey) as well as green vegetation. Large mammals and large birds also typically have fairly large home ranges. The scenario also assumes that such vegetation will be consumed from the same sites for 90 consecutive days. These assumptions make the scenario quite unlikely.

Wildlife G03 sheet, the exposure HQ for aquatic plants, algae and fish had typical values greater than 1.0 from an accidental spill and for aquatic plants and algae typical HQ

values exceed 1.0 for peak EEC (Expected Environmental Concentrations). This is not of significant concern because:

- With the provision of riparian buffer strips on streams, the risk of herbicide spills or movement into streams is further reduced.
- Mixing and dilution in active streams will minimize any potential hazard from any small spills or runoff which might occur during implementation of this project.
- All herbicide application in the Brawley Mountain project will be confined to the mid-upper slopes and ridgetop sites, well away from any streams. No herbicide application will occur within the riparian corridor.

Hazard quotients for exposure of sensitive and tolerant terrestrial plants from runoff of triclopyr ester have hazard quotients greater than 1.0 for areas which receive more than 20 inches of annual rainfall. These values vary depending on the average annual rainfall in a given area and the scenarios assume that rain falls every 10 days. However, all proposed herbicide applications are to be applied directly to the targeted vegetation; therefore by correctly following application procedures, impacts to non-targeted species would be minimal. This will further protect non-targeted vegetation, including rare plants, from any direct or indirect impacts. Although some loss of terrestrial plants could possibly occur, there are mitigation measures already in place to protect sensitive species so overall effects should be minimal.

Imazapyr, foliar treatment @ 0.45 lbs/acre

This will be applied in a mix containing 3oz triclopyr ester and 0.5 oz imazapyr and is applied lightly over the top to just speckle the vegetation. This mixture uses less active ingredient per acre than a formulation containing only imazapyr. The analysis was run using the standard application rate of 0.45 lb/acre. The expected application rate would use approximately 0.1 lbs/acre.

Wildlife G03 sheet, hazard quotients for sensitive fish, aquatic plants and algae had typical exposures greater than 1.0 for accidental spills. The *upper* bound HQ for aquatic plants for peak ECC exceeded 1.0 although the typical value was less than 0.1. While imazapyr does have the potential to reach aquatic areas through runoff, such actual exposure and risk are mostly unlikely. Directed foliar sprays using imazapyr should be done in July or August when material washed off leaves tends not to be picked up by roots of non-target plants, allowing good selectivity. Imazapyr appears to bind loosely to clay particles and organic matter. It has relatively low soil mobility; soil activity expresses itself during the period of spring leaf expansion but applications made from late June through mid September produce little or no evidence of soil activity. With the provision of riparian buffer strips on stream zones, the risk of herbicide spills or movement into stream zones is further reduced. Perennial, intermittent, and ephemeral streams would be protected by 100, 100 & 25-foot buffers respectively, within which no imazapyr would be applied. Imazapyr might be able to move through the buffer, but are

subject to dilution and mixing in transit. In addition, no imazapyr will be applied within 100 horizontal feet of lakes, wetlands, or perennial or intermittent streams or within 100 horizontal feet of any public or domestic water source. Exclusion zones will be clearly marked before herbicide application so applicators can easily see and avoid them. All herbicide application in the Brawley Mountain project will be confined to the mid-upper slopes and ridgetop sites, well away from any streams. No herbicide application will occur within the riparian corridor.

Hazard quotients for exposure of sensitive terrestrial plants from runoff for imazapyr are greater than 1.0 for areas that receive more than 10 inches of rainfall per year. These values vary depending on the average annual rainfall in a given area and the scenarios assume that rain falls every 10 days. However, all proposed herbicide applications are to be applied directly to the targeted vegetation; therefore by correctly following application procedures, impacts to non-targeted species would be minimal. In addition, Imazapyr, the only herbicide proposed that has some degree of soil activity (only in the spring), will be applied only from late June to mid September when the chemical has little or no evidence of soil mobility. This will further protect non-targeted vegetation, including rare plants, from any direct or indirect impacts. Although some loss of terrestrial plants could possibly occur, there are mitigation measures already in place to protect PETS species so overall effects should be minimal.

APPENDIX C. PESTICIDE EMERGENCY SPILL PLAN

Field personnel transporting or working with pesticides should familiarize themselves with this plan, as well as with the labels and MSDSs of all pesticides to be used in a project. A copy of this plan is to be carried to the field by all crews working with pesticides; a copy is also to be kept in an easily accessible location near the telephone at the district dispatch or reception desk.

Emergency procedures to follow when a pesticide spill occurs at the work site:

1. PROVIDE FOR CARE OF INJURED OR CONTAMINATED PERSONNEL

Immediately determine if any personnel are injured or contaminated. Each situation may differ, but the major and immediate effort should be to assist injured personnel and minimize further contamination. Accordingly, the following must be accomplished as rapidly as possible.

- A. If a fumigant or dangerous vapor is involved, put on the appropriate respirator or breathing device. REMEMBER, this is an emergency procedure, and not intended for prolonged exposure. Since many pesticides can produce toxic fumes or vapors, always ventilate enclosed areas to prevent build-up of toxic fumes.
- B. Remove injured or contaminated personnel from the spill site to a safe area.
- C. If eyes are contaminated with a pesticide, give first priority to washing them out, using portable eyewash bottles, or if these are unavailable, any clean water. Remove contaminated clothing from affected individuals, and wash pesticides off skin with detergent and clean water. If any pesticides have been ingested, see Material Safety Data Sheet for specific first aid measures.
- D. Immediately seek medical assistance for injured and contaminated personnel. Do not leave contaminated individuals alone unless essential to secure aid. If necessary, direct a third person to stay with the injured until a physician takes charge and has been advised of the actual or possible pesticide exposure.
- E. Watch for the following symptoms of pesticide poisoning: Eye irritation, skin irritation, gastrointestinal discomfort, dizziness, headache, nausea, vomiting, diarrhea, slurred speech, muscle twitching or convulsions, or difficulty in breathing.

2. SPILL IDENTIFICATION

Determine product name(s) for the chemical(s) spilled and check the label and Material Safety Data Sheet for immediate hazards. Shut off ignition sources and stop any smoking in case chemicals may be flammable. Isolate contaminated area and keep unnecessary people away.

3. NOTIFY (Field personnel contact dispatcher/receptionist for aid)

District Pesticide Specialist: Steve Cole
Office – 706-782-3320 ext 105
Cell – 706-499-8473
Home - 706-754-9341

District Safety Officer: Teresa Brown
Office – 706-745-6928 ext. 114
Cell - 706-781-5256
Home - 706-745-2953

Give the following information: ***Chemical name, ***location of spill, ***compartment number and ***stand number (if known), ***road name, and ***estimated size of spill in gallons.

The District Pesticide Specialist will notify other key personnel and agencies as required (see attached notification list).

4. CONTAIN SPILL

Spilled pesticides must be contained as much as possible on the site where the spill has occurred. Keep spilled pesticides from entering streams, storm drains, wells, ditches, or water systems by following these procedures:

- A. Wear appropriate protective clothing. At a minimum, this will include suitable clothing for pesticide application, plus rubber or nitrile gloves and safety glasses or goggles. In addition, use coveralls or a rain suit, rubber boots or overshoes, or a respirator if extra protection is needed.
- B. Prevent further leakage from containers by repositioning them so that the damaged part of the container is above the level of the contents, or by applying rags, tape, or other materials at hand to temporarily seal the leak.
- C. Separate leaking containers from undamaged containers.
- D. Rope or flag off the area and post warning signs to keep unprotected personnel from entering.

- E. Confine the spill to prevent it from spreading. Encircle the spill area with a dike of sand or other absorbent material; rags or similar material may be used if necessary. If spilled material may flow toward sensitive areas, divert it by ditching.
- F. If the spill involves a small watercourse, dam it up to confine the spill if possible. If available, activated charcoal may be used to filter contaminated water. For larger waterways, a log boom or baled straw may be used to contain the spill. Dam or divert the flow of clean water around the spill if possible. Some pesticides (such as Glyphosate and Diquat) may be inactivated by muddying the water.
- G. If the pesticide spilled is a liquid, cover it with absorbent material (kitty litter is ideal). If the spilled pesticide is in a dry formulation, cover it with a secured plastic tarpaulin to prevent it from becoming wet or being blown away. (NOTE: Unless this material can be reused in accordance with the pesticide label, it must be disposed of as a toxic waste.)
- H. DO NOT flush the spill into a ditch, sewer, drain, or off a road, since this will further spread the chemical necessitating a larger cleanup effort.

Vehicle spill kits contain necessary items for containing small spills (see attached list for items needed in vehicle spill kit). Large spills may require the use of a dozer and/or additional items from the storage facility spill kit, located at the Brasstown Work Center.

5. CLEAN-UP

Spill containment is the objective of this emergency spill plan. Clean-up and disposal procedures are covered in FSH 2109.14, Chapter 33, Project Safety Plan; in the 1993 Emergency Response Guidebook ("Orange Book"), and in the Material Safety Data Sheets for each pesticide.

6. DOCUMENTATION

Document spill type, action taken, and any needed follow-up or assistance necessary in a letter to the Forest Supervisor, with cc to Regional Pesticide Specialist.

SUMMARY OF CLEAN-UP STEPS

DRY SPILLS

- a. Immediately cover powders or dusts with plastic or a tarpaulin to prevent the pesticide from becoming airborne. A fine mist of water may also be used to

dampen the dust and reduce spreading. CAUTION: Too much water may dissolve the pesticide and move it into the soil.

- b. Sweep the material together, rolling the tarp back slowly as you do.
- c. Shovel the material into plastic bags or drums.
- d. Seal the bags and label them, identifying the pesticide and other contents.
- e. Store the containers of material in the pesticide storage building until the contents can be evaluated for disposal or re-use in a manner consistent with labeling.

LIQUID SPILLS

Pump or bail as much of the spilled liquid as possible into containers, then:

- a. Use absorbent material, such as commercially bagged clay, kitty litter, or sawdust to soak up the spill. Use only enough material to absorb the spill. Begin spreading the absorbent material around the edge of the spill, and work toward the center.
- b. Shovel the absorbent material and pesticide, along with any contaminated soil, into leak-proof containers.
- c. Label all containers.
- d. Store the containers in the pesticide storage building until the contents can be evaluated for disposal or re-use in a manner consistent with labeling.

NOTIFICATION LIST OF KEY PERSONNEL AND AGENCIES

1. Forest Pesticide Specialist: Ron Stephens
Office – 770-297-3020
Home - 770-983-0782
2. District Safety Officer: Teresa Brown
Office – 706-745-6928 ext. 114
Cell - 706-781-5256
Home - 706-745-2953
3. Union County Hospital 706-745-2111
4. Union County Fire Department 911
5. Union County Sheriff 706-439-6066
6. Forest Pesticide Specialist – Ron Stephens
Home 770-983-0728
Office 770-297-3020
(Notify if spill is larger than 5 gallons)
7. State office of emergency services – GEPD Emergency Response
(800) 241-4113
(404) 656-4300
<http://www.dnr.state.ga.us/dnr/environ/>
(Notify only if assistance is necessary or if required by state law)
8. USFS Region 8 Spill Coordinator – Walt Sternke
Office – 404-347-3369
wsternke@fs.fed.us
9. Pesticide manufacturers

Riverdale (Tricopyr and Glyphosate) 1-800-424-9300 (Chemtrec)
BASF (Imazapyr) 1-800-832-HELP
10. CHEMTREC - EPA number for technical assistance - 1-800-424-9300
11. EPA National Emergency Response Center - 1-800-424-9346
(Notify only if spilled chemical is on CERCLA Consolidated Chemical List)
12. Pesticide Safety Team of the National Agricultural Chemicals Association (for technical assistance) - 1-513-961-4300

13. Local sources of emergency equipment and supplies

Nelson's ACE Hardware 706-745-6380

Owltown Feed & Supply 706-745-4525

Patton Grading 706-745-7697

Georgia Forestry Commission 706-781-2398

RECOMMENDED PESTICIDE SPILL KIT CONTENTS

Storage Facility Kit

4 pairs nitrile gloves

2 pairs unvented goggles

2 respirators and cartridges (chemical resistant)

2 pairs rubber or neoprene boots or overshoes

2 pairs of coveralls or rain suits

1 roll of flagging or engineers' tape

1 dust pan

1 shop brush

1 dozen polyethylene bags with ties

1 gallon liquid detergent

1 polyethylene or plastic tarp

100 feet of rope

10 blank labels

1 ABC-type fire extinguisher

80 lbs absorbent material

3 gallons household bleach

1 square-point "D" handled shovel

1 55-gallon open-head drum, or 50-gallon plastic trash can with lid

1 18-inch push broom with synthetic fibers

1 bung and 1 bung wrench for 2.5 inch and 0.75 inch bungs

1 drum spigot

30 ft. of .5 inch polyethylene tubing or 150 feet of garden hose

Vehicle Kit

2 pairs nitrile gloves

1 pair unvented goggles

1 respirator and cartridges

1 pair of rubber or neoprene boots

1 dust pan

1 shop brush

6 polyethylene bags with ties

1 pint liquid detergent

1 polyethylene or plastic tarp

10 blank labels

1 ABC-type fire extinguisher

10-30 lbs. absorbent material

2 eyewash bottles

1 round-point shovel

1 portable weatherproof container for storage and transport (may also be used for cleanup)

APPENDIX D. AGENCIES AND INDIVIDUALS PROVIDING CONSULTATION

Scott Frazier, Georgia Department of Natural Resources, Senior Wildlife Biologist

Sandy Henning, Chattahoochee-Oconee National Forests, Sales Forester

John Petrick, Chattahoochee-Oconee National Forests, Planner

Ken Riddleburger, Georgia Department of Natural Resources, Regional Supervisor

Cindy Wentworth, Chattahoochee-Oconee National Forests, Botanist/Ecologist

APPENDIX E. PERSONS, AGENCIES, AND ORGANIZATIONS PROVIDING PUBLIC INPUT

Mark Alexander – Georgia Chapter of the Sierra Club

Mark Banker – Ruffed Grouse Society

Pare Bowlegs – Seminole Nation of Oklahoma

Steve Cartwright – Benton MacKaye Trail Association

Bill Cunningham – Georgia Chapter of the Ruffed Grouse Society

Matthew Davis, Appalachian Trail Conservancy

Sarah A. Francisco – Southern Environmental Law Center

Scott Frazier, Georgia Department of Natural Resources

Dan Forster – Georgia Department of Natural Resources

David Govus – Georgia Forest Watch

Wayne Jenkins – Georgia Forest Watch

Dr. James Earl Kennamer, National Wild Turkey Federation

George Owen – Benton MacKaye Trail Association

Betty J. Perry – Benton MacKaye Trail Association

Carol Perry, Benton MacKaye Trail Association

Ben Prater – Southern Appalachian Biodiversity Project

Denny Rhodes – Georgia Appalachian Trail Club

Ken Riddleburger, Georgia Department of Natural Resources

Bill Ristom – Benton MacKaye Trail Association

Bill Ross, Benton MacKaye Trail Association

James Walker – Georgia Forest Watch

Shawn White, Georgia Forest Watch

Jim Wilson – Atlanta Audubon Society

APPENDIX F. PERSONS AND ORGANIZATIONS NOTIFIED OF THE PROPOSED ACTION

On December 15, 2005, 67 entities were mailed a scoping letter detailing the proposed actions of the Brawley Mountain Project. The mailing list for the scoping letter is in the project file.

APPENDIX G. LIST OF PREPARERS

Name	Title
Becky Bruce	Archeologist
Charlene Breeden	Forest Hydrologist
Sheldon Henderson	Forester (retired)
Nathan Klaus	Wildlife Biologist (Georgia DNR)
Alison Koopman	Natural Resources Recreation Manager
David Kuykendall	Outdoor Recreation Planner
Dick Rightmyer	Forest Soil Scientist
Ron Stephens	Forest Silviculturalist
Jim Wentworth	Wildlife Biologist
Mary Yonce	Forester Trainee

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